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Control Lake Timber Sales

Final Environmental Impact Statement

Volume I—EIS

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Control Lake Environmental Impact Statement

Final Environmental Impact Statement

Control Lake

United States Department of Agriculture
Forest Service—Alaska Region
Alaska

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Abstract

The Forest Service proposes to implement the Tongass Land Management Plan by harvesting timber in the Control Lake Project Area. Timber volume would be offered to timber companies under the Tongass National Forest Timber Sale Program. The actions analyzed in this EIS are designed to implement direction contained in the Tongass Land Management Plan (TLMP 1997). The Final EIS describes five alternatives which provide different combinations of resource outputs and spatial locations of harvest units. The alternatives are: Alternative 1, No Action, proposes no new harvest from the Project Area at this time; Alternative 10 emphasizes units that can be most readily harvested by small operators and completely avoids harvest in the Honker Divide, Logjam Creek, and Rio Roberts watersheds, and the Western Peninsula; Alternative 11 avoids harvest in the Honker Divide area, upper Logjam Creek, and most of the Rio Roberts watershed, limits harvest in the Western Peninsula, and allows harvest near the 1997 Forest Plan Revision implementation level in most other zones; Alternative 12 allows harvest at the full 1997 Forest Plan Revision implementation level in all zones that permit harvest; and Alternative 13 was formed in response to public and agency comments and combines elements of Alternatives 10 and 11.

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Summary

Introduction

In compliance with the National Environmental Policy Act (NEPA) and other relevant state and Federal laws and regulations, the Forest Service has prepared this Final Environmental Impact Statement (EIS) on the effects of timber harvest in the Control Lake Project Area on Prince of Wales Island, Alaska. This Final EIS is designed to inform the public of the proposed action and its effects, and to respond to public comments on the Supplemental Draft EIS.

Changes Between Supplemental Draft EIS and Final EIS

This Final EIS incorporates several changes from the Supplemental Draft EIS. First, it incorporates refined information resulting from additional field reconnaissance on many of the units. Second, it responds to public and agency input on the Supplemental Draft EIS. Finally, it presents revised analyses of the refined harvest units and alternatives.

Refined information was incorporated into the Final EIS from field reconnaissance performed by Forest Service staff on a number of units and roads. This information resulted in refinement to unit boundaries and road routing and included dropping some units and roads and changing a number of units to helicopter. In addition, unit boundaries were refined to fully implement the buffer widths defined by the TLMP Revision (1997).

Public and agency input on the Supplemental Draft EIS included written comments received and
comments from meetings with the public, organizations, and state and federal agencies. Appendix B presents the written comments and Forest Service responses. Specific concerns regarding wildlife, biodiversity, Honker Divide, the Elevenmile area, subsistence, and other issues led to the development of a new alternative, Alternative 13, which is a modified version of Alternatives 10 and 11. Alternative 13 is analyzed in the Final EIS. The Final EIS also incorporates changes in access management of the existing road system based on public comments.

New analysis was required to analyze the effects of refined Alternatives 10, 11, and 12, and new Alternative 13 in Chapters 2 and 4 of the Final EIS. Further, because of the recent completion of the new Forest Plan, many analyses were revised so that they tier more closely with those in the Forest Plan Final EIS. Unit and road cards were revised and are presented in Appendices D and E, respectively.

The ROD for the 1997 TLMP identified Control Lake as a Category 3 timber sale project. Projects in Category 3 need to be consistent with all the applicable management direction of the revised plan, except for new standards and guidelines for wildlife, which address landscape connectivity, endemic terrestrial mammals, northern goshawk, and marten. These new standards and guidelines were implemented in a manner that was least disruptive to the design and implementation of the project. Specific modifications were made to units in VCU 597.2 to maintain high value marten habitat.

Proposed Action

The Forest Service proposes to harvest up to an estimated 86 million board feet (MMBF) of timber, construct or reconstruct an estimated 84 miles of roads, and use existing log transfer facilities (LTFs) at Naukati, Winter Harbor, and other locations to implement the action alternatives. Timber sale offerings from this harvest will be made available to the Tongass National Forest Timber Sale Program. Based on this environmental study and analysis, the Forest Supervisor will decide whether and how to make timber available from the Control Lake Project Area. Forest Supervisor decisions will include:

- The volume to make available from this Project Area in multiple timber sales;
- The location and design of timber harvest units;
- The location and design of road systems;
- Road management objectives including closures for resource protection and economics;
- Necessary mitigation measures and monitoring;
- Whether there may be a significant restriction on subsistence use, and if so, related findings and measures to minimize impacts on subsistence users; and
- Whether to adjust the boundaries of small Old-growth Habitat Reserves, which would require a non-significant Forest Plan Amendment.

Purpose and Need

The purpose and need for this project is to implement direction contained in the 1997 Tongass Land and Resource Management Plan (Forest Plan), to help provide a sustained level of timber supply to meet annual and Forest Plan planning cycle market demand, and to provide diverse opportunities for natural resource employment, consistent with providing for the multiple use and sustained yield of all renewable forest resources. Another objective is to provide timber volume that will contribute to the Ketchikan Area Timber Sale Program. The alternatives and actions considered are possible approaches to meeting this purpose and need. The EIS study process was designed to help ensure that, in meeting this purpose and need, the Forest Service makes the most informed decision possible for this project area specifically, and for the Tongass National Forest generally. The Control Lake Timber Sales Project could provide up to maximum of approximately 86 MMBF of timber, given the guidance of the Forest Plan.

Under the Forest Plan, approximately 45 percent of the Project Area is included in Land Use Designations (LUDs) that allow programmed timber harvest. The majority of the project is in LUDs which do not allow programmed timber harvest. This primarily includes the Semi-Remote Recreation LUD that covers the Elevenmile shore and most of the Western Peninsula portion of the Project Area; the Honker Old Growth Habitat Reserve (OGHR) in the eastern portion of the Project Area; and, small OGHRs in the Rush Peak, Logjam, Steelhead and Election Creek areas. A comparison of the desired future condition for the Timber Production, Modified Landscape and Scenic Viewshed LUDs in the Project Area with the existing condition shows an opportunity to harvest suitable stands of old growth and to produce managed productive stands capable of long-term timber production. Approximately 22,800 acres of mature and overmature timber are suitable and available for programmed timber harvest within those LUDs which allow timber harvest.

Section 101 of the Tongass Timber Reform Act of 1990 (TTRA) directs the USDA Forest Service "... to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle.'' Section 101 of the TTRA specifies that Forest Service efforts to seek to meet market demand are subject to appropriations, National Forest Management Act (NFMA) requirements, and other applicable laws.

There is demonstrated mill capacity in the region to process the logs, if the supply of timber is available. There is also a projected need for the timber volume being considered from this project area (see Appendix A, Final EIS) for the Forest Service to come closer to meeting an objective of providing timber under contract to the existing dependent industry, as a means of providing for stability in relation to fluctuating market demand (Morse, 1995). There is a substantial component of the economy of Southeast Alaska that is dependent on a viable timber industry. There is also a need on Prince of Wales and Southeast Alaska for timber sales to support a growing number of small and medium sized operators and mills. Based on these factors, the need for the project is clearly indicated.

Public Participation

Public involvement in the Control Lake Project decision-making process began formally on September 27, 1993 with the mailing of the scoping package, which invited comment on the scope of the issues and areas of major concern to be addressed in the environmental analysis. A news release was also issued and newspaper advertisements were also placed about that time containing much of the same information and inviting comments. A Notice of Intent (NOI) to prepare an EIS was published in the Federal Register on October 6, 1993. Public scoping meetings were held in Klawock, Thorne Bay, and Ketchikan. Individual consultations also took place between Control Lake project team members and community representatives, environmental organizations, timber industry representatives, agency representatives, and other interested parties.

The Draft EIS was released in October 1995 and subsistence hearings and public open houses were held in Klawock, Thorne Bay, Coffman Cove, and Ketchikan in December 1995. Many comments were received and reviewed and analyzed; responses are provided in Appendix B of the Supplemental Draft EIS.

A NOI to prepare a Supplemental Draft EIS was published in the Federal Register on August 14, 1997. A news release, announcing the availability of this Supplemental Draft EIS was issued. Public meetings were held in Thorne Bay, Klawock, and Naukati. Many other meetings were held with organizations and agencies. Again, many comments were received and analyzed; responses are provided in Appendix B of this Final EIS.

Issues

Based on consultation with the public and government agencies, the scoping comments and Draft EIS comments received, the subsistence hearings, and internal scoping, seven issues were identified that were determined to be significant and within the scope of this EIS. These issues have been addressed by alternative development (e.g., a total of 12 different alternatives have been developed and analyzed for the project), with mitigation, or by analyzing the effects in terms of the issues. The seven significant issue areas are: (1) Honker Divide; (2) Recreation and Visual Quality; (3) Subsistence; (4) Wildlife Habitat and Biodiversity; (5) Fish Habitat and Water Quality; (6) Timber; and (7) Karst and Cave Resources.

Alternatives Considered in Detail

Four alternatives are considered in detail in the Supplemental Draft EIS. These include the No Action Alternative (Alternative 1) and three action alternatives (Alternatives 10, 11, and 12). Alternatives 3 and 5 were previously considered, but not analyzed in detail. Alternatives 2, 4, 6, 7, 8, and 9 were previously analyzed in detail and presented in the Draft EIS (including appendices), but are no longer being considered.

Alternative 1

The No Action alternative, Alternative 1, would result in no additional timber harvest or road construction in the Control Lake Project Area. This alternative serves as a baseline, against which the three action alternatives are measured.

Alternative 10

Alternative 10 results in the harvest of 964 acres in 31 harvest units producing 26 MMBF of net sawlog and utility volume. To implement this harvest, approximately 21 miles of road would be constructed or reconstructed. This alternative does not schedule harvest in the Honker Divide ("ridge-to-ridge") north of Forest Road 30, in the Upper Logjam Creek area, in Rio Roberts Watershed, or in the Western Peninsula. It attempts to emphasize community-based, value-added products by choosing units that would be more easily harvested by independent and small operators. Units in this alternative minimize road construction, are smaller, and use conventional logging systems. This alternative was independently developed by a group consisting of environmental organization representatives, independent timber contractors, Alaska natives, educators, business owners, and fishermen, most of which are residents of Prince of Wales Island.

Alternative 11

If Alternative 11 is implemented, it would result in the harvest of 2,980 acres in 91 harvest units producing approximately 71 MMBF of new sawlog and utility volume. To implement this harvest, approximately 62 miles of road would be constructed or reconstructed. This alternative was designed to be completely consistent with the 1997 Forest Plan Revision. It avoids harvest within all of the Old-Growth Habitat and Semi-Remote Recreation LUD's including the Honker Divide area, Rio Roberts Watershed, most of the Western Peninsula, and other areas. Alternative 11 reflects collaborative efforts between the Forest Service and other federal and state agencies.

Alternative 12

If Alternative 12 were implemented, it would result in the harvest of 3,769 acres in 112 harvest units producing approximately 86 MMBF of new sawlog and utility volume. To implement this harvest, approximately 84 miles of road would be constructed or reconstructed. This alternative was designed to provide a maximum level of harvest consistent with the 1997 Forest Plan Revision. It avoids harvest within all of the Old-Growth Habitat and Semi-Remote Recreation LUD's including the Honker Divide area, Rio Roberts Watershed, most of the Western Peninsula, and other areas.

Alternative 13

Alternative 13 would result in the harvest of 2,577 acres in 79 harvest units producing approximately 61 MMBF of new sawlog and utility volume. To implement this harvest, approximately 46 miles of road would be constructed or reconstructed. This alternative was designed based on comments from the public and agencies and incorporates elements of Alternatives 10 and 11. It would completely defer harvest in the Elevenmile area, the Rio Roberts watershed, and the area north of the 30 Road in the vicinity of Rio Beaver Creek.

Effects of the Alternatives

The alternatives are compared and evaluated relative to the significant issues in the following paragraphs:

Issue 1—Honker Divide

Under Alternatives 10, 11, and 13, changes to the unroaded character of the Honker Divide would not occur; the unroaded character would be only slightly affected under Alternative 12. Therefore, roaded access and related recreation and subsistence use would increase very slightly under Alternative 12, but remain nearly unchanged under Alternatives 10, 11, and 13.

For Alternatives 11, 12, and 13, there would be some potential for recreationists using the Thorne River/Honker Divide canoe route to hear logging activities. This potential is highest in Alternative 12.

The high wildlife habitat value of this area associated with the large unfragmented block of old growth would not be reduced under Alternatives 10, 11, and 13, and would be very slightly reduced under Alternative 12.

Issue 2—Recreation and Visual Quality

During the Project Area visual assessment, 11 Priority Travel Routes and Use Area viewsheds were identified. Among these, 6 are considered important for comparison because of their visual sensitivity and the presence of harvest units within them. The degree of change in the visual quality from these Priority Travel Routes and Use Areas is considered in relationship to the number of harvest units potentially affecting them. The visual quality effects associated with all of these Priority Travel Routes and Use Areas is low to moderate and falls within standards and guidelines. Changes in the visual quality along Forest Highway #9/30 Road would be highest with Alternative 12, lowest with Alternative 10, and intermediate with Alternatives 11 and 13.

The alternatives would have minimal effects on existing and potential recreation sites. All action alternatives would result in a reduction in the area of unroaded ROS settings, with Alternative 12 having the largest change and Alternative 10 having the smallest. For Alternative 12, timber harvest and road construction would result in a change of approximately 36,119 acres of unroaded to roaded ROS settings. For Alternative 10, timber harvest and road construction would result in a change of approximately 7,124 acres from unroaded to roaded ROS settings.

Issue 3—Subsistence

Deer hunting is the major aspect of subsistence use that is affected by timber harvest. Based on the wildlife analysis, Sitka black-tailed deer habitat capability in the Project Area WAAs would be reduced from 0.2 to 1.2 percent after 25 years by the action alternatives. Alternative 12 would have the greatest effect and Alternative 10 would have the least effect. Alternative 1 would result in no change. In all cases, current total deer harvest levels in the Project Area would be greater than 10 percent of estimated habitat capability. Under all alternatives, including Alternative 1, there may be a significant possibility of significant restriction of subsistence use of Sitka black-tailed deer by the residents of most local communities in the future.

Black bear and marten habitat capabilities appear to be below needed populations in some areas and close to needed populations for the Project Area as a whole under all alternatives including Alternative 1.

Issue 4—Wildlife Habitat and Biodiversity

The major effects on wildlife habitats in all action alternatives are the reduction of old-growth forest habitat and the increased access provided by the construction or reconstruction of roads into presently unroaded areas. Alternative 12 would harvest 3,328 acres of old-growth habitat and Alternative 10 would harvest 834 acres. Alternatives 11 and 13 would harvest 2,606 and 2,244 acres, respectively.

Alternative 12 would result in the greatest effects on old-growth habitat and effects due to increased access, while Alternative 10 would result in the least among the action alternatives. All alternatives would result in impacts consistent with the implementation of TLMP (1997).

Issue 5—Fish Habitat and Water Quality

No measurable effects on fish habitat or water quality are expected under any of the alternatives. All alternatives meet the requirement and intent of the Clean Water Act. Implementation of identified fish habitat enhancement opportunities could increase habitat for fish production. Implementation of TTRA-required stream buffers, additional-width buffers per the Forest Plan Standards and Guidelines, and BMPs and other relative mitigation measures would effectively mitigate fish habitat and water quality impacts.

Most major watersheds in the Project Area have experienced prior road construction and timber harvest. Reentering these drainages may generate a greater potential risk of impacts on water quality, with the risk expected to be greater in those watersheds with the higher cumulative harvest percentages. Based on the analysis presented here, none of the alternatives are expected to produce significant watershed effects; the risk of effects would be highest under Alternative 12 and lowest under Alternative 10.

Measures of potential risk to water quality and fish habitat are: (1) an index of the amount of soil disturbance, which is related to the area harvested, the logging systems used, and the area disturbed during road construction; (2) the amount of harvest on slopes with a high mass movement index; (3) the amount of riparian area harvested outside of no-cut buffers and the number of Class I, II, and III/IV stream road crossings. These measures are quantified in Table 2-2. Review of Table 2-2 indicates that Alternative 10 ranks lowest and Alternative 12 ranks highest in these measures of potential risk.

Potential effects on marine habitats and organisms would also be lowest under Alternative 10 and highest under Alternative 12 in proportion to timber volume that could be transported to existing LTFs.

Issue 6—Timber Economics and Supply

Preliminary economic analysis indicates that overall net stumpage values would be positive for all action alternatives using high market timber prices (Table 2-1). Alternative 12 has the lowest stumpage value, and Alternative 10 has the highest (Table 2-1). Alternatives 10 and 13 have the highest PNVs. Alternative 12 has the highest payment to the State of Alaska followed by Alternatives 11, 13, and 10. Alternative 12 would create the highest number of jobs followed by Alternatives 11, 13, and 10.

Timber supply analysis indicates the distribution between geographic areas on Prince of Wales Island is expected to change from patterns of past harvest. Future harvest will shift away from the northern and north-central road systems and towards the south-central and isolated areas. This is expected to decrease the timber harvest levels available for communities in the northern half of Prince of Wales Island that are dependent on harvest from National Forest System lands. Likewise, communities in the southern half and isolated areas of Prince of Wales Island could expect an increase in timber harvest levels in the future.

As indicated in Chapter 4, and depending on the amount of site-specific mitigation needed to meet resource objectives, the Project Area could provide entries of 35 to 75 MMBF per decade after implementation of the Control Lake timber sales from old-growth timber alone for the next 5 decades.

Issue 7—Karst and Cave Resources

Within the total unit pool of harvest units, three units include low-to-moderate vulnerability karst; there are no units that are rated as high vulnerability. The potential extent of affected karst within the harvest units is about 10 acres for Alternatives 11, 12, and 13, and none for Alternative 10. Specific mitigation measures to minimize the potential for adverse effects have been prescribed for all three units.

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Chapter 1

Purpose and Need for Action

Chapter 1

Purpose and Need for Action

Key Terms

Land Use Designation (LUD)—the method of classifying land uses presented in the Forest Plan (Tongass Land Management Plan [TLMP 1997]).

MMBF—million board feet.

Offering—a Forest Service specification of timber harvest units, subdivisions, roads, and other facilities and operations to meet the requirements of a timber sale.

Old-growth forest—an ecosystem distinguished by old trees and related structural attributes. Old-growth forests encompass the latter stages of stand development. They typically differ from earlier stages of stand development in a variety of characteristics which may include tree size, accumulation of large dead woody material, number of canopy layers and tree species composition, and ecosystem function.

Scoping process—activities used to determine the scope and significance of a proposed action, what level of analysis is required, what data is needed, and what level of public participation is appropriate.

Value Comparison Unit (VCU)—areas that generally encompass a drainage basin to provide a common set of areas where resource inventories could be conducted and resource interpretations made.

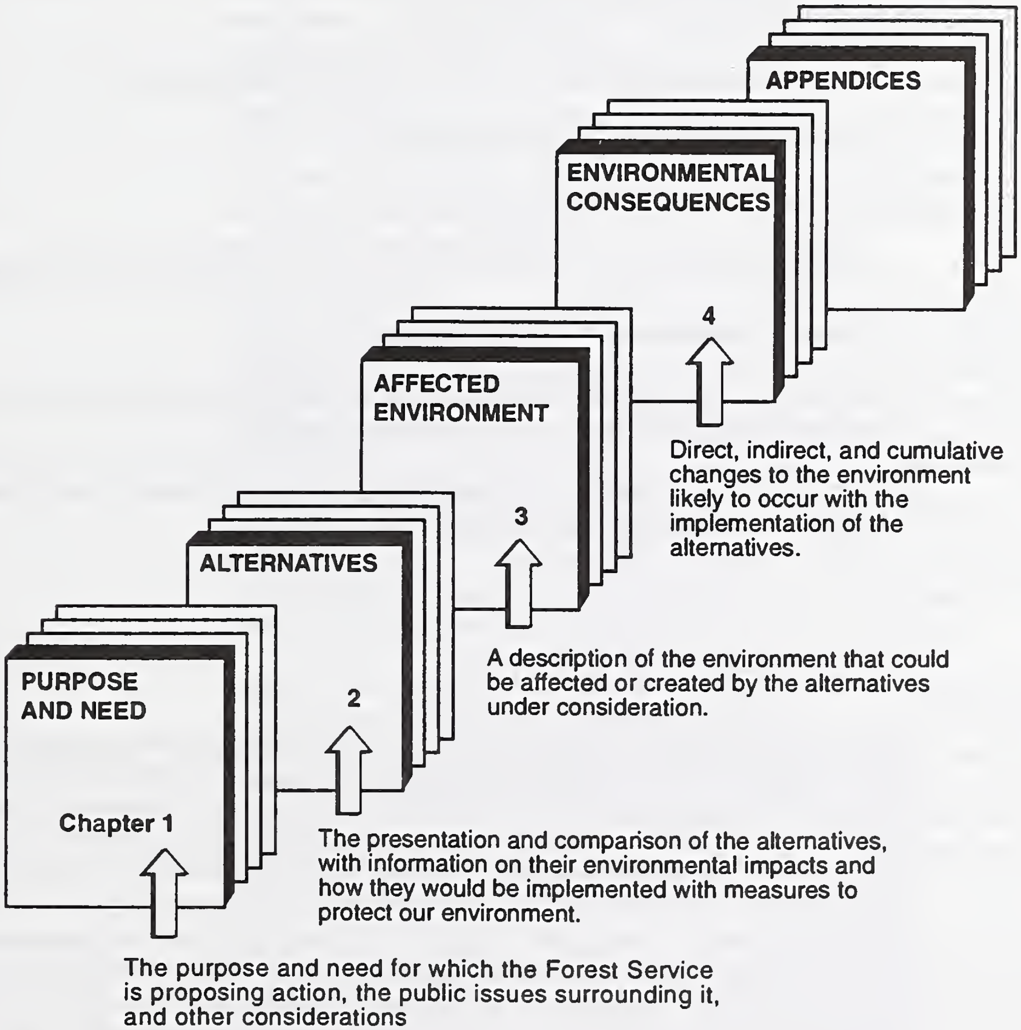
Introduction

In compliance with the National Environmental Policy Act (NEPA) and other relevant state and Federal laws and regulations, the Forest Service has prepared this Final Environmental Impact Statement (EIS) on the effects of timber harvest in the Control Lake Project Area (Figure 1-1) on Prince of Wales Island, Alaska. This Final EIS is designed to inform the public of the proposed action and its effects, and to respond to public comments on the Supplemental Draft EIS. The Supplemental Draft EIS was prepared to respond to several changed conditions. First, it addressed the fact that timber volume from Control Lake would no longer be provided to Ketchikan Pulp Company (KPC) under the Long-term Timber Sale Contract. Second, it considered the closure of the KPC pulp mill. Finally, it evaluated effects under the 1997 Forest Plan Revision. The Final EIS reflects updated information from additional field investigations and incorporates additional Forest Plan information, analyses, and concepts.

The EIS discloses the direct, indirect, and cumulative environmental impacts and any irreversible or irretrievable commitment of resources that would result from each alternative proposed. It is prepared according to the format (Figure 1-2) established by Council on Environmental Quality (CEQ) regulations implementing NEPA.

Figure 1-1
Project Vicinity Map

Figure 1-2
How this EIS is Organized



Proposed Action

The Forest Service proposes to harvest up to an estimated 86 million board feet (MMBF) of timber, construct or reconstruct an estimated 84 miles of roads, and use existing log transfer facilities (LTFs) at Naukati, Winter Harbor, and other locations to implement the action alternatives. Timber sale offerings from this harvest will be made available to the Tongass National Forest Timber Sale Program. Based on this environmental study and analysis, the Forest Supervisor will decide whether and how to make timber available from the Control Lake Project Area. Forest Supervisor decisions will include:

- The volume to make available in this Project Area in multiple timber sales;
- The location and design of timber harvest units;
- The location and design of road systems;
- Road management objectives including closures for resource protection and economics;
- Necessary mitigation measures and monitoring;
- Whether there may be a significant restriction on subsistence use, and if so, related findings and measures to minimize impacts on subsistence users; and
- Whether to adjust the boundaries of small Old-Growth Habitat Reserves, which would require a non-significant Forest Plan Amendment.

Purpose and Need

The Control Lake Project is proposed at this time to respond to the goals and objectives identified by the Forest Plan (TLMP, 1997) for the Project Area and to move the Project Area towards the desired future conditions described in the Forest Plan. The Forest Plan identified the following goals and objectives: (1) improve timber growth and productivity on suitable timber lands made available for timber harvest and manage these lands for a long-term sustained yield of timber; (2) contribute to a timber supply from the Tongass that seeks to meet annual and planning cycle market demand; and (3) provide a diversity of opportunities for resource uses, which in turn contributes to the local and regional economies of Southeast Alaska (Forest Plan, pp. 2-3 to 2-4). The Control Lake Project will respond to these goals and objectives, and will also help move the Project Area towards the desired future condition identified by the Plan by managing suitable timber lands in the Timber Production, Modified Landscape, and Scenic Viewshed Land Use Designations (LUDs). Timber production lands are managed for production of sawtimber and other wood products on an even-flow sustained yield basis. An extensive road system provides access for timber management activities and other uses. Some roads are closed to address resource concerns. Management activities will generally dominate most seen areas. These stands are healthy and in a balanced mix of age classes. A variety of wildlife habitats, predominantly in the early and middle successional stages, are present. Modified Landscape lands are similar to Timber Production except that popular travel routes and use areas seen by recreationists, visitors, and other will view a landscape less modified by management activities. Management activities in the visual foreground will be subordinate to the characteristic landscape, but may dominate in the middleground and background. Scenic Viewshed lands are similar to Modified Landscape except those using identified popular travel routes and use areas will view a natural appearing landscape. Management activities in the foreground will not be evident to the casual forest visitor and will be subordinate in the middleground and background (Forest Plan, pp. 3-127, 3-135 to 3-136, and 3-144).

Timber Growth and Productivity

Losses to the timber resource caused by age decay and disease are considerable in old-growth forests, and it is not uncommon for over 30 percent of the timber volume in old-growth stands to be defective and thus unusable for wood products. Tree vigor tends to decrease with maturity, causing an increase in susceptibility to disease and decay fungi. Disease and decay processes are a natural part of forest ecosystems, and play a key role in providing wildlife habitat in old-growth forests. Fifty-five percent of the Project Area is allocated to non-development LUDs, mostly Old-growth Habitat. The desired condition for Old-growth Habitat lands states that all forested areas in this LUD will have attained old-growth forest characteristics, providing a diversity of old-growth habitat types and associated species and subspecies and ecological processes. Timber volume from this LUD (such as salvage) does not contribute to the Forest-wide allowable sale quantity. The non-development LUDs in conjunction with the LUDs which are developed, provide a landscape designed to assure well distributed, viable populations of species while producing goods and services through time.

The Forest Plan allocated 32 percent of the land within the Control Lake Project Area (non-encumbered lands) to the Timber Production Land Use Designation (LUD). The desired future condition for these lands, as identified by the Forest Plan, states that they are to be managed for the production of sawtimber and other wood products on an even-flow, long-term sustained yield basis (Forest Plan, p. 3-144). An additional 13 percent of the land within the Control Lake Project Area is allocated to the Scenic Viewshed or Modified Landscape LUDs. The desired future condition for these lands states, in part, that they will produce a yield of timber which contributes to the Forest-wide sustained yield (Forest Plan, pp. 3-127, 3-136). Harvesting aging stands, including those in declining health, on lands that allow timber harvest and replacing them with faster growing, healthy stands will reduce the volume loss associated with decay and disease and increase the growth and yield of the managed forest land.

Currently, western hemlock makes up about 80 percent of the old-growth forests in the Project Area. Western hemlock is susceptible to dwarf mistletoe, a disease that does not infect Alaska cedar or western red cedar and rarely infects Sitka spruce. Western hemlock also appears to have more insect enemies than Sitka spruce. In addition, western hemlock has the lowest economic value of the four species. Harvesting existing stands dominated by the western hemlock will encourage the growth of the Sitka spruce and the cedars, creating a more diverse species mix and minimizing losses due to insects and diseases that are species-specific.

Market Demand

Section 101 of the Tongass Timber Reform Act of 1990 (TTRA) directs the USDA Forest Service "... to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle." Section 101 of the TTRA specifies that Forest Service efforts to seek to meet market demand are subject to appropriations, National Forest Management Act (NFMA) requirements, and other applicable laws. Supporting a wide range of natural resource employment opportunities, including timber related, within the southeast Alaska's communities is an objective of the TLMP and the Alaska National Interest Lands Conservation Act (ANILCA), as amended by the TTRA.

There is demonstrated mill capacity in the region to process logs, if a supply of timber is available. There is also a projected need for the timber volume being considered from this project area for the Forest Service to come closer to meeting an objective of providing a supply

of timber under contract to the existing dependent industry (see Appendix A), as a means of providing for stability in relation to fluctuating market demand (Morse, 1995). There is a substantial component of the economy of Southeast Alaska that is dependent on a viable timber industry.

Reasons for scheduling the Control Lake Project Area at this time, for detailed consideration of timber harvest under the Tongass National Forest Timber Sale Program, may be summarized as follows:

- The Control Lake Project Area contains a sufficient amount of harvestable timber volume designated as Timber Production, and is therefore appropriate for harvest under the Forest Plan. Available information indicates harvest of the amount of timber being considered for this project can occur consistent with the Forest Plan standards and guidelines and other requirements for resource protection.

- Areas with available timber will be necessary to consider for harvest in order to seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle, pursuant to Section 101 of the TTRA.

- Effects on subsistence resources are projected to differ little according to which sequence these areas are subjected to harvest. Harvesting other areas on the Tongass National Forest with available timber is expected to have similar potential effects on resources, including those used for subsistence because of widespread distribution of subsistence use and other factors. Harvest of these other areas is foreseeable, in any case, over the forest planning horizon under the Forest Plan.

- Providing substantially less timber volume than required to meet the TLMP and TTRA Section 101 timber supply and employment objectives in order to avoid harvest in the Control Lake Project Area or other project areas is not necessary or reasonable.

- It is reasonable to schedule harvest in the Control Lake Project Area at the present time rather than other areas in terms of previous harvest entry and access, level of controversy over subsistence and other effects, and the ability to complete the NEPA process and make timber available. Other areas that are reasonable to consider for harvest in the near future are the subject of other project EISs that are currently ongoing or scheduled to begin soon.

Additional information about why the Control Lake area was selected is provided in Appendix A.

Local Employment Opportunities

Timber is one of several valuable resources on the Tongass and many people depend on it for their livelihood. Timber from the Tongass is harvested for sawn wood products such as lumber and cants and wood chip exports, and is the basis for a major industry in Southeast Alaska that provided about 1,749 direct jobs in Fiscal Year 1996 (Alaska Department of Labor, May 1997). The Tongass timber program is part of a long-term cooperative effort among the Federal government, the State of Alaska, and local governments to provide diverse opportunities for natural resource employment. The Control Lake Project will contribute towards this effort, providing the opportunity for approximately 8.24 jobs and $350,000 in associated income per MMBF harvested (Forest Service IMPLAN model - base year 1992). Thus, the Proposed Action for the Control Lake Project Area would provide the opportunity for up to 709 jobs and $30.1 million in associated income.

There are several small independent timber operations on Prince of Wales Island and approximately two dozen small sawmills. The Project Area is centrally located on the island road system, close to the majority of these mills, most of which are in Klawock, Thorne Bay, Coffman Cove, Naukati, and White Pass.

Project Area

The 201,371-acre Control Lake Project Area is located on Prince of Wales Island, approximately 50 air miles west of Ketchikan, Alaska (Figure 1-1). Craig and Klawock sit to the south of the Project Area and Thorne Bay to the east. The Project Area contains the Rio Roberts Research Natural Area, designated to allow natural processes to evolve without measurable human influence for research and development purposes. The Thorne River and Hatchery Creek combine to form a free-flowing river corridor along the eastern edge of the Project Area. This corridor is referred to in this EIS as the Honker Divide, extending for about 42 miles from Barnes Lake to the Thorne River estuary. The corridor offers nationally recognized recreation opportunities including canoeing, fishing, wildlife viewing, and hunting. The river system was recommended in the Record of Decision (ROD) for the new Forest Plan (1997) for addition to the National Wild and Scenic Rivers System as a combination Scenic/Recreational River.

The Decision-Making Process

National forest planning takes place at several levels. The decision making begins with long-range planning at the national level, continuing down through the regional and forest levels to the project level. The Control Lake Project is part of this hierarchical planning process. This EIS is a project-level analysis; its scope is confined to issues within the Control Lake Project Area. It does not attempt to address decisions made at higher levels. It does, however, implement direction provided at those higher levels.

Relationship to Forest Plan

The NFMA directs each National Forest to prepare an overall plan of activities. The Forest Plan provides land and resource management direction for the forest. It establishes LUDs to guide management of the land for certain uses. The LUDs describe the activities that may be authorized within Value Comparison Units (VCUs). VCUs generally subdivide the LUDs into logical analysis units.

The Forest Plan also guides all natural resource management activities by establishing forest-wide standards and guidelines. These standards and guidelines apply to all or most areas of the Forest and are used in conjunction with the management prescriptions for each LUD.

For the Tongass National Forest, the Forest Plan is the 1997 TLMP. The Control Lake EIS tiers to the Forest Plan EIS (TLMP, 1997) and the Alaska Regional Guide EIS (1983). In some instances, it incorporates documented analysis from the Forest Plan by reference (40 Code of Federal Regulations [CFR] 1502.21) rather than repeating it in this EIS.

Land Use Designations

The Forest Plan designates areas appropriate for various activities through the use of 19 LUDs. These LUDs include management objectives and specific standards and guidelines designed to ensure attainment of those objectives. Standards and guidelines take precedence over annual targets or projected outputs; no project will be funded for which the standards and guidelines cannot be implemented. The Forest Plan LUDs in the Project Area are described below. Figure 1-3 shows the VCUs and Forest Plan LUDs. National Forest System lands in the Project Area encompass 179,231 acres; of these, 8,159 acres are encumbered because of land selections by the State or Native Corporations.

- **Timber Production** - These lands are managed for the production of saw timber and other wood products on an even-flow, long-term sustained yield basis. An extensive road system will be developed for accessing the timber and for recreation uses, hunting, fishing, and other public and administrative uses; some roads may "be closed, either seasonally or year-long, to address resource concerns." Management activities will usually dominate most seen areas. A variety of wildlife habitats, predominantly in the early and middle successional stages, are present. They comprise 32 percent of the non-encumbered National Forest System lands in the Project Area.

- **Modified Landscape** - This LUD provides for a variety of uses. Timber harvest and roads are allowed and the yield contributes to the Forest-wide sustained yield. Management activities are subordinate to the characteristic landscape as seen in the foreground from popular travel routes and use areas. In the middle to background distance, management activities may dominate the characteristic landscape. A variety of successional stages provide a range of wildlife habitat conditions. The Modified Landscape LUD occupies 9 percent of the Project Area.

- **Scenic Viewshed** - In areas managed under the Scenic Viewshed LUD, forest visitors and others using identified popular travel routes and use areas will view a natural-appearing landscape. Management activities in the foreground will not be evident to the casual visitor. Activities in the middleground and background will be subordinate to the characteristic landscape. Timber yields will contribute to the Forest-wide sustained yield. A variety of successional stages providing wildlife habitat occur, although late-successional stages predominate. The Scenic Viewshed LUD comprises 4 percent of the Project Area.

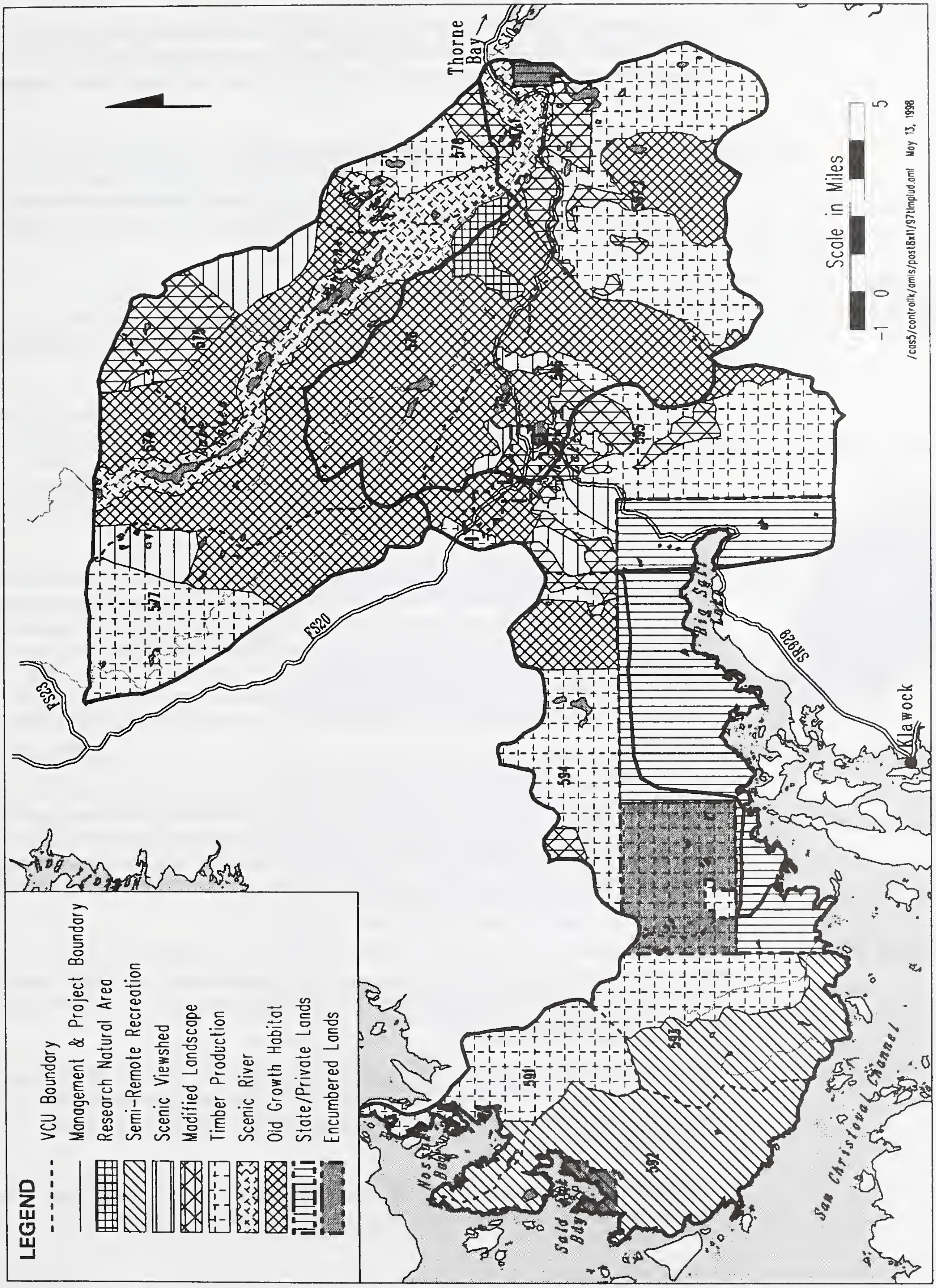
- **Semi-remote Recreation** - Areas in the Semi-remote Recreation LUD are characterized by generally unmodified natural environments. Ecological processes and natural conditions are only minimally affected by past or current human uses or activities. Timber harvest and road construction are generally not permitted. This LUD occupies 13 percent of the Project Area.

- **Old-growth Habitat** - In lands within this LUD, old-growth forests are to be maintained and early seral conifer stands are to be managed to achieve old-growth forest characteristics. The objective is to achieve a diversity of old-growth habitat types and associated species and subspecies and ecological processes. Timber harvest is not permitted except to achieve the LUD objective and roads and other facilities are to be avoided. These lands occupy 34 percent of the Project Area.

- **Scenic River** - The Scenic River LUD is used to maintain, enhance, and protect the free-flowing character and outstandingly remarkable values of river segments designated as Scenic Rivers and included in the National Wild and Scenic Rivers System. Ecological processes and changes may be somewhat affected by human uses. Recreation users are to have the opportunity for experiences ranging from Primitive to Roaded Natural in a natural-appearing setting. A yield of timber may be produced that contributes to the Forest-wide sustained yield, but resource activities within the river corridor are not to be visually evident to the casual observer. This LUD comprises 7 percent of the Project Area.

- **Recreational River** - The Recreational River LUD is used to maintain, enhance, and protect the essentially free-flowing character and outstandingly remarkable values of river segments designated as Recreational Rivers and included in the National Wild and Scenic Rivers System. Ecological processes and changes may be affected by human uses. Recreation users are to have the opportunity for a variety and range of experiences in a modified but

Figure 1-3
VCUs and Forest Plan LUDs



pleasing setting. A yield of timber may be produced that contributes to the Forest-wide sustained yield. Resource activities and developments may be present within the river corridor and may dominate some areas. Less than 1 percent of the Project Area is occupied by this LUD.

- **Research Natural Area** - This LUD is used to preserve areas of ecological importance in their natural condition for the purposes of research, monitoring, education, and/or to maintain natural diversity. They are characterized by essentially unmodified environments in which natural ecological processes prevail. This LUD represents 1 percent of the Project Area.

Forest-wide Standards and Guidelines

The forest-wide standards and guidelines apply to areas within the LUDs. They often represent additional restrictions and are used in conjunction with the management prescriptions for each LUD. The following are examples of some of these forest-wide standards and guidelines.

- **Beach and Estuary Fringe** - The beach and estuary fringe is an area approximately 1,000 feet slope distance inland from the mean high tide around all marine coastline. Programmed timber harvest is not allowed and roads are to be located outside of beach and estuary fringes whenever possible. The fringes are to be managed to maintain their ecological integrity to provide sustained natural habitat conditions and requirements for wildlife, fish, recreation, heritage, scenery, and other resources.

- **Riparian** - The riparian standards and guidelines are designed to maintain riparian areas in mostly natural conditions for fish, other aquatic life, old-growth and riparian-associated plant and wildlife species, and water-related recreation, and to provide for ecosystem processes, including important aquatic and land interactions. To achieve this, Riparian Management Areas (RMAs), which are areas of special concern to fish, other aquatic resources, and wildlife, are delineated as identified in the stream process group direction found on pages 4-56 through 4-73 in the Forest Plan. Timber harvest is not scheduled in Riparian Management Areas.

- **Karst and Cave Resources** - The karst and cave resource standards and guidelines are designed to maintain the natural karst processes and the productivity of the karst landscape while providing for other land uses and to protect and maintain significant caves and cave resources. Potential karst areas have been analyzed and categorized into low, medium, and high vulnerability categories. High vulnerability areas are not suitable for programmed timber harvest.

Other Land Status

In addition to national forest lands that are managed according to the above LUDs, some national forest lands are encumbered because they have been selected by the State or Native corporations (8,159 acres). Non-federal lands also occur within the project area (22,140 acres). These other lands are described below.

- **Encumbered Lands** - This is not a designated LUD in the TLMP. However, for purposes of this EIS, it designates areas within the Project Area that have been selected but not yet conveyed to the State or to Native corporations and are not considered in the action alternatives.

- **Alaska State Lands** - These are lands belonging to the State of Alaska. In the Project Area, State-owned parcels occur near Thorne Bay, Control Lake, and Salt Lake Bay.

- **Private Lands** - A large parcel of private land occurs in the Project Area around the Big Salt Lake. This parcel is owned by Sealaska Corporation.

Scoping and Public Involvement

The Control Lake Project Team followed the NEPA process (40 CFR 1501.7) to determine the scope of the issues to be addressed by the environmental analysis and to identify major concerns related to the proposed action. Scoping and public involvement are ongoing processes used to invite public participation and collect initial comments. The Project Team sought public comment through several means, including those summarized below. The Control Lake Scoping Report (Enserch Environmental Corporation, 1994) and the Project Planning Record contain a full description of scoping and public involvement activities.

- Scoping package mailed to Project mailing list on September 27, 1993.

- Notice of Intent to prepare an EIS published in Federal Register on October 6, 1993.

- Newspaper advertisements announcing scoping process placed in the *Ketchikan Daily News* and the *Island News* on October 4, 1993.

- News release issued on September 28, 1993 announcing scoping process. Scoping meetings held in Klawock (October 18, 1993), Thorne Bay (October 19, 1993), and Ketchikan (October 20, 1993).

- Individual consultations held from June 1993 through October 1994 with community representatives, environmental organizations, timber industry representatives, agency representatives, and other interested parties.

Draft EIS

- News release announcing the release of the Draft EIS sent to all media outlets on the Ketchikan Area Public Affairs Office mailing list.

- Newspaper advertisements announcing the schedule and locations of the subsistence hearings placed in the *Ketchikan Daily News* and the *Island News.*

- Draft EIS released in October 1995. Release of the Draft EIS triggered a minimum 45-day public comment period; however, comments were received and considered well into early 1996.

Subsistence hearings on the Draft EIS were held in the communities listed below. Open houses were held in conjunction with the subsistence hearings to describe the analysis process and answer public questions on the Draft EIS. Public comment on the Draft EIS was accepted at that time. Dates, times, and locations were included in the cover letter accompanying the Draft EIS and were publicized in the local media.

- Ketchikan — December 4, 1995

- Klawock — December 5, 1995

- Thorne Bay — December 6, 1995

- Coffman Cove — December 7, 1995

Supplemental Draft EIS

Analysis and Incorporation of Public Comments on the Draft EIS
Public comments and subsistence comments were reviewed, analyzed, and incorporated into the Supplemental Draft EIS. Written comments, hearing testimony, and Forest Service responses were included in Appendix B of the Supplemental Draft EIS.

Issuance of Supplemental Draft EIS

- Notice of intent to prepare a Supplemental Draft EIS published in Federal Register on August 14, 1997.
- News release announcing the release of the Supplemental Draft EIS sent to all media outlets on the Ketchikan Area Public Affairs Office mailing list.
- Release of the Supplemental Draft EIS triggered a minimum 45-day public comment period.
- Public meetings were held in Thorne Bay, Klawock, and Naukati to describe the Supplemental Draft EIS, answer public questions, and collect comments. The District Ranger also visited with the Klawock and Craig IRAs to discuss the Supplemental Draft EIS. Similar meetings were held with the Klawock City Council, Prince of Wales Community Advisory Council, Alaska Forest Association, and various state and federal agencies.

Final EIS

Analysis and Incorporation of Public Comments on the Supplemental Draft EIS
Public comments on the Supplemental Draft EIS were reviewed, analyzed, and incorporated into the Final EIS. Written comments and Forest Service responses are included in Appendix B of the Final EIS.

Issues

Based on the consultation conducted with members of the public and government agencies, the scoping comments, the Draft EIS comments, and Supplemental Draft EIS received on the Control Lake Project, and the internal scoping process, seven issues were identified that were determined to be significant and within the scope of this EIS. These seven issue areas, Issues 1 through 7 below, represent concerns raised by the public, agencies, Native Alaskan tribal governments, communities, or the Forest Service. They were addressed through alternative development, and the environmental consequences of the alternatives have been analyzed in terms of these issues. At the end of this section, issues considered but eliminated from detailed study, because their resolution falls outside the scope of the Control Lake Project, are presented.

Significant Issues

Issue 1: Honker Divide
A key public concern is the use of the Honker Divide area, a nationally recognized recreation corridor. Some respondents advocate protecting the area from timber harvest and road construction. Definitions of the Honker Divide area vary, but some respondents advocate a protected area that contains the lands from ridge top to ridge top, including the Control Creek basin. Some, however, desire additional roaded access points to the lake and river system which they say would increase recreational opportunities. Several commenters cited the high value of the Honker Divide wildlife habitat and referred to the Viable Population (VPOP) Committee recommendations and the protection of the large old-growth block in the Honker Divide area as ways to maintain a functioning old-growth ecosystem on Prince of Wales Island. Others cite Honker Divide as particularly important for fish habitat.

Issue 2: Recreation and Visual Quality

In addition to the interest in the Honker Divide from a recreational standpoint, commenters expressed concern with the recreation impact of the loss of roadless areas on Prince of Wales Island. Some advocated maintaining the visual quality of the 30 Road Corridor and Cutthroat Lakes Area. This heavily used travel route (to Thorne Bay) includes the Eagles Nest Campground and Control Lake. It remains in a relatively natural state, and was designated for visual management as a Priority Travel Route. Suggestions include using selective harvest along this heavily traveled road to maintain the visual quality of the corridor. Some of the most popular fishing holes occur in this area (e.g., between the 30 Road and the Thorne River). The trail to the lower Rio Roberts Creek fish pass is heavily used, and some noted that harvesting the area adjacent to the trail would affect the aesthetics of fish viewing.

Issue 3: Subsistence

This issue centers around the potential effects, including the cumulative effects, of timber harvest and road construction on the abundance and distribution of subsistence resources, and the opportunities for harvest of these resources. Commenters noted that roads reduce subsistence opportunities; they also make it easier for wolves to cover territory faster, increasing their successful predation of deer. Some commenters, however, want roads left open after logging is completed for ease of access and to facilitate deer harvest. Some expressed concern specifically with the effects of timber harvest in the Western Peninsula because of the high subsistence use there by the residents of Klawock and Craig. Concern ranges from diminished subsistence resources to increased competition for subsistence resources due to the presence of logging roads. This area has unique cultural significance for Alaska Natives, especially from Klawock. Adjacent bays also provide valuable protected anchorages for local boats. Other aspects of subsistence concern include competition from nonrural resource users and access to the resources, as well as changes in the character of the experience of the activity as a focus of cultural identity.

Issue 4: Wildlife Habitat and Biodiversity

The Project Area provides important wildlife habitat, and the wildlife supported are valuable for subsistence, recreational, aesthetic, economic, and ecological purposes. Of primary concern are the effects of timber harvest and associated road construction on species dependent on old-growth forest habitat. Also of concern are the effects of timber harvest operations, due to the fragmentation of existing large blocks of old-growth habitat and the potential decline in biological diversity. This issue relates to a number of different conservation strategies including those involving old-growth reserves. This issue also includes the long-term disposition of previously mapped old-growth areas (or other areas as old-growth retention) in the Project Area. The Rio Roberts Watershed is part of this concern since it serves as a corridor connecting the large unharvested block of old growth in Honker Divide with the Karta Wilderness.

Issue 5: Fish Habitat and Water Quality

This issue addresses public concern for maintaining water quality in streams and nearshore marine waters that provide habitat for anadromous, resident, and marine fish. Streams and streamside habitat throughout the Project Area provide important shelter, food, spawning, and rearing areas for anadromous and resident fish. Crab, shrimp, clams, mussels, and various marine fish are found in the estuaries and marine waters associated with the Project Area. Anadromous and resident fish are important to sport, commercial, and subsistence users throughout Southeast Alaska. Some expressed concern about harvest on steep, unstable slopes and about additional harvest and road-building in the Rio Beaver Watershed. Others objected to timber harvest in the Rio Roberts Watershed, which provides a good control for fish and water quality studies. The lower part of this watershed area (not including the fish pass and trail used in ongoing smolt studies) is proposed as a Research Natural Area (RNA).

Issue 6: Timber

This issue encompasses public concern with the amount of timber available and proposed for harvest. Specific issues include maintaining a timely and sufficient timber supply to the timber industry, whether timber harvest should be continued, how to balance timber production with other Forest uses, and how to apportion the harvest. It includes the issue of how the Project Area contributes to the long-term timber supply and whether too much timber is being harvested at this time on Prince of Wales Island. This issue also relates to maintaining the economic viability of future entries in the Project Area; but it also relates to the concern for developing alternatives that can avoid below-cost sales. It also includes the question of whether there should be timber harvest in the Honker Divide; some say no because of its recreational value, others say yes because of the economic benefits that logging the area would have for the region. Some argue that the harvest units in the Western Peninsula, specifically, are not economic. This issue includes the question of how much helicopter logging should be used because of the expense of such logging. Public concern also includes the fact that the Project Area historically has been designated for the independent sales program because it is outside the KPC primary sale area. Finally, several commenters said that the purpose and need for the project should not be tied to a specific volume; 187 MMBF may be too high for this area.

Issue 7: Karst and Cave Resources

Concern with this issue centers on how cave and karst resources in the Project Area will be managed. Although cave systems and karst occur in the Control Lake Project Area, they are less extensive than on other areas of northern Prince of Wales Island. Recent studies reveal that extensive cave systems and other karst features throughout Prince of Wales Island represent a complex ecosystem involving hydrology, fisheries production, high wildlife value, and high timber productivity. Caves also have a higher probability of cultural resources. Significant cave systems require protection under the Cave Resource Protection Act of 1988. Areas underlain by karst, because of their high timber productivity, have been heavily affected by timber harvest over the past 30 years. Concern with the cumulative impacts of this and future timber harvest is growing.

Issues Outside the Scope of this EIS

The following items raised in scoping letters fall outside the scope of this project-specific EIS:

- Consider Honker Divide for “wild” status under the Wild and Scenic Rivers Act. This is a Forest planning issue. Wild and Scenic River eligibility and suitability analyses and recommendations for designations were dealt with during the Forest planning process.

- Below-cost timber sales should end. This is a national issue and not within the scope of an individual project.

LEGISLATIVE AND EXECUTIVE ORDERS RELATED TO THIS EIS

Below is a brief list of laws and Executive Orders pertaining to timber harvest and the preparation of EISs on Federal lands. Some of these laws are specific to Alaska, while others pertain to all Federal lands.

- Alaska National Interest Lands Conservation Act (ANILCA) of 1980
- Alaska Forest Resources and Practices Act of 1979 (as amended in 1991)
- Alaska Native Claims Settlement Act (ANCSA) of 1971

- American Indian Religious Freedom Act of 1978
- Archaeological Resources Protection Act of 1979
- Archaeological Resources Protection Act of 1980
- Cave Resource Protection Act (1988)
- Clean Air Act of 1970 (as amended)
- Clean Water Act of 1977 (as amended)
- Coastal Zone Management Act (CZMA) of 1976
- Endangered Species Act of 1973
- Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974
- Marine Mammal Protection Act of 1972
- Multiple Use Sustained Yield Act of 1960
- National Environmental Policy Act (NEPA) of 1969 (as amended)
- National Forest Management Act (NFMA) of 1976 (as amended)
- National Historic Preservation Act of 1966
- Native American Graves Protection and Repatriation Act of 1990 (Public Law 101-601)
- Tongass Timber Reform Act (TTRA) of 1990
- Wild and Scenic Rivers Act of 1968, amended 1986
- Executive Order 11988 (floodplains)
- Executive Order 11990 (wetlands)
- Executive Order 11593 (cultural)
- Executive Order 12898 (environmental justice)
- Executive Order 12962 (recreational fishing)

Several laws and planning documents deserve particular note because of their direct influence on the timber sale program:

- **TTRA**—the Tongass Timber Reform Act was signed into law by President Bush on November 28, 1990. This TTRA made certain unilateral changes in the KPC Long-term Contract to make it more consistent with independent National Forest timber sales programs, required the Tongass National Forest to seek to meet the market demand for timber, and required minimum stream buffers for fish protection.

- **ANCSA**—the Alaska Native Claims Settlement Act, Public Law 92-203, 85 Stat. 688 (as amended), was enacted in 1971 to provide for the settlement of certain land claims of Alaska Natives. ANCSA has been the basis for conveying selected lands under administrative jurisdiction of the Tongass National Forest to Native corporations.

- **ANILCA**—ANILCA, signed into law on December 2, 1980 (Public Law 96-487), established several areas to be preserved for the benefit, use, education, and inspiration of present and

future generations. Title VIII of the Act addresses the use of public lands for subsistence—the customary and traditional uses by rural Alaska residents of wild, renewable resources.

- **CZMA**—the Coastal Zone Management Act of 1976 also pertains to the preparation of EISs. While Federal lands are excluded from the coastal zone as prescribed in the Act, the Act does require that when Federal agencies conduct activities that directly affect the coastal zone, those activities must be consistent to the maximum extent practicable with the approved State coastal management program. The Alaska coastal management program is contained in the Alaska Coastal Management Plan.

- **Prince of Wales Area Plan**—the Prince of Wales Area Plan proposes guidelines for how State-owned lands should be managed within the Prince of Wales planning area (ADNR, 1988).

FEDERAL AND STATE PERMITS AND LICENSES

To proceed with the timber harvest as addressed in this Final EIS, various permits must be obtained from other government agencies. The agencies and their responsibilities are listed below.

- U.S. Army Corps of Engineers

  Approval of discharge of dredged or fill material into waters of the United States (Section 404 of the Clean Water Act).

  Approval of construction of structures or work in navigable waters of the United States (Section 10 of the Rivers and Harbors Act of 1899).

- U.S. Environmental Protection Agency

  Storm water discharge permit.

  National Pollutant Discharge Elimination System review (Section 402 of the Clean Water Act).

- State of Alaska, Department of Natural Resources

  Authorization for occupancy and use of tidelands and submerged lands.

- State of Alaska, Department of Environmental Conservation

  Certification of compliance with Alaska Water Quality Standards (Section 401 Certification).

  Solid Waste Disposal Permit (Section 402 of the Clean Water Act).

- U.S. Coast Guard

  Coast Guard Bridge Permit (in accordance with the General Bridge Act of 1946) required for all structures constructed within the tidal influence zone.

AVAILABILITY OF PROJECT FILES

The Planning Record is a comprehensive project file documenting the process of developing this Final EIS. The complete Planning Record is in the Forest Supervisors office in Ketchikan, Alaska. The reader also may want to refer to the 1997 Forest Plan, the Tongass Timber Reform Act, the Resource Planning Act, the Alaska Regional Guide and its Final EIS, ANILCA, or ANCSA. These are available at public libraries around the region as well as all Forest Service offices.

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Chapter 2

Alternatives

Chapter 2

Alternatives

Key Terms

BMPs— Best Management Practices - practices used for the protection of water quality.
Desired future condition— a concise statement that describes a desired condition to be achieved sometime in the future. The 1997 TLMP Revision describes a desired future condition for each LUD. It is normally expressed in broad, general terms and is timeless in that it has no specific date by which it is to be completed.
Implementation monitoring— collecting information to evaluate whether mitigation measures were carried out in the manner called for.
Late-successional— referring to an older forest (about 100 to 200 years old) just prior to becoming old growth.
Mid-market— an economic estimate of timber value at a point in time when half of the timber was harvested at a higher value and half was harvested at a lower value.
Mitigation— measures designed to counteract or lessen environmental impacts.
MMBF— a million board feet. A board foot is that volume of wood equivalent to a board 12 inches by 12 inches by 1 inch in size.
Partial cut— harvest of timber using silvicultural prescription other than clearcut; examples include shelterwood, seed tree, and group selection.
Subsistence— the customary and traditional uses by rural Alaskan residents of wild renewable resources for direct personal or family consumption.

Introduction

This chapter describes and compares the alternatives considered by the Forest Service for the Control Lake Project. The first section describes the process followed to formulate the alternatives. The next section addresses how ecosystem management is being implemented on this project. This section is followed by descriptions of the alternatives considered but eliminated from detailed study, and the alternatives considered in detail. A comparison of the alternatives, including how each alternative addresses the significant issues, follows these sections. The last two sections describe site-specific mitigation measures and the monitoring proposed for the project.

Changes between Supplemental Draft EIS and Final EIS

This Final EIS incorporates several changes from the Supplemental Draft EIS. First, it incorporates refined information resulting from additional field reconnaissance on many of the units. Second, it responds to public and agency input on the Supplemental Draft EIS. Finally, it presents revised analyses of the refined harvest units and alternatives.

Refined Information

Refined information was incorporated into the Final EIS from field reconnaissance performed by Forest Service staff on a number of units and roads. This information resulted in refinement to unit boundaries and road routing and included dropping some units and roads and changing a number of units to helicopter. In addition, unit boundaries were refined to fully implement the buffer widths defined by the TLMP Revision (1997).

Public/Agency Input

Public and agency input on the Supplemental Draft EIS included written comments received and comments from meetings with the public, organizations, and state and federal agencies. Appendix B presents the written comments and Forest Service responses. Specific concerns regarding wildlife, biodiversity, Honker Divide, the Elevenmile area, subsistence, and other issues led to the development of a new alternative, Alternative 13, which is a modified version of Alternatives 10 and 11. Alternative 13 is analyzed in the Final EIS. The Final EIS also incorporates changes in access management of the existing road system based on public comments.

Revised Analysis

New analysis was required to analyze the effects of refined Alternatives 10, 11, and 12, and new Alternative 13 in Chapters 2 and 4 of the Final EIS. Further, because of the recent completion of the new Forest Plan, many analyses were revised so that they tier more closely with those in the Forest Plan Final EIS. Unit and road cards were revised and are presented in Appendices D and E, respectively.

TLMP (1997) Transition

The ROD for the 1997 TLMP identified Control Lake as a Category 3 timber sale project. Projects in Category 3 need to be consistent with all the applicable management direction of the revised plan, except for new standards and guidelines for wildlife, which address landscape connectivity, endemic terrestrial mammals, northern goshawk, and American marten. These new standards and guidelines were implemented in a manner that was least disruptive to the design and implementation of the project. The extent to which these measures were incorporated was determined through review by an interagency implementation team consisting of the National Marine Fisheries Service (NMFS), Environmental Protection Agency, U.S. Fish and Wildlife Service (USFWS), and pertinent state agencies. Specific modifications were made to units in VCU 597.2 to maintain high value marten habitat.

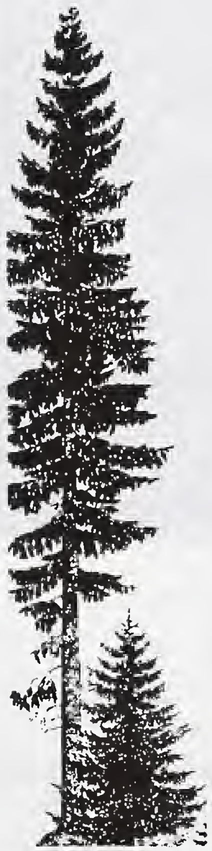
Development of Alternatives

Each alternative presented in this Final EIS represents a different response to the issues discussed in Chapter 1. Four action alternatives were developed that meet the stated purpose and need of the project. Each action alternative consists of a site-specific proposal developed through intensive interdisciplinary team evaluation of timber harvest unit and road design based on ground verification of all units and roads considered, along with 1991 color aerial photos, topographic maps, and a large quantity of available resource data in Geographic Information System (GIS) format.

Scoping for the Control Lake Project began in June 1993. The Interdisciplinary (ID) Team reviewed and analyzed the issues developed during scoping and identified the significant issues described in Chapter 1. Options for addressing the issues were discussed and areas of overlap among methods of addressing issues were examined by the ID Team. Issues identified as significant were categorized according to whether they: (1) are dealt with by land use allocations at the Forest Plan level; (2) will be addressed through implementation of standards and guidelines defined by the Forest Plan; (3) can be addressed through project-specific mitigation measures; (4) can be addressed through unit allocation under all or most alternatives; (5) should be used to drive or partially drive an alternative; or (6) are beyond the scope of this EIS. The issues placed in categories 4 and 5 were the primary factors considered by the ID Team in the development of the frameworks for the action alternatives.

Concurrent with scoping and the ID Team review of scoping issues, logging and transportation engineers and resource specialists from the ID Team developed a detailed Logging System and Transportation Plan that was specific to the Control Lake Project Area and consistent with the TLMP Revision Supplement to the Draft EIS (TLMP Draft Revision, 1991a). This plan was based on previous logging and transportation system plans available for portions of the Project Area, updated topographic maps, 1991 aerial photos, and the available GIS data. In developing the plan, the ID Team identified harvest unit boundaries for all suitable and available commercial forest land in the Project Area, including those areas accessible only by helicopter, and identified the road system required to access these lands.

The ID Team then conducted an intensive review of the Logging System and Transportation Plan and identified how much area could be harvested at this time consistent with Forest Plan standards and guidelines. The major factors limiting the number of potential harvest units available for allocation were: (1) adjacency; (2) cumulative visual disturbance; and (3) cumulative watershed effects. Based on this review, 333 harvest units and associated roads, representing one possible configuration, were identified. The 333 harvest units in the initial unit pool covered 16,170 acres.



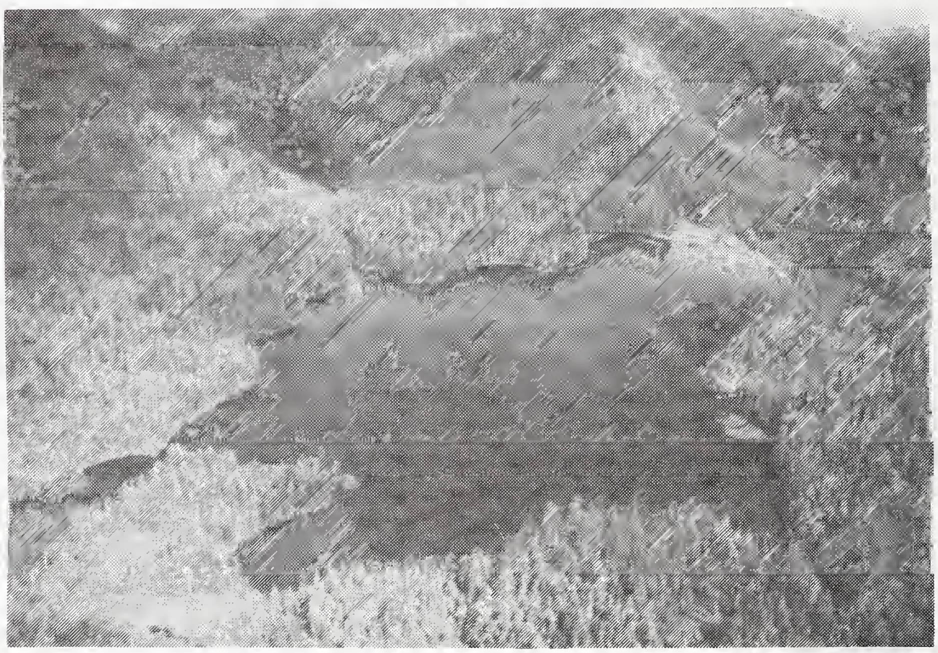
These 333 harvest units represented the pool of units available for allocation to the action alternatives. Available aerial photos, topographic maps, and GIS plots and data for each of these units were reviewed and each unit was ground-verified by a team of specialists during summer 1993. Ground verification included preliminary flagging of unit boundaries, including buffers, and observations regarding watershed, soils, caves, sensitive plants, fish and wildlife habitat and presence, and visual, recreation, and cultural resources. Preliminary road routes were also examined for feasibility and flagged by road locators. Based on ground verification, 83 units were deferred or eliminated from consideration during this study for a variety of reasons. These reasons included very high mass movement soils, stands having less than 8,000 board feet of timber volume per acre, adjacency, and other factors. Many of these units would be available in future entries. In addition, the boundaries of most units were modified (generally the units were made smaller) and the locations of most roads were changed based on what was observed on the ground.

The resulting pool of units was reduced from 333 units to 250 units. The initial unit pool acreage was dropped from 16,170 acres to 9,409 acres, or 42 percent. The unit pool was reduced again between the Draft EIS and the Supplemental Draft EIS to reflect the 1997 TLMP Revision. This new unit pool was 4,510 acres and included 123 units. A final reduction in unit pool size was made between the Supplemental Draft EIS and the Final EIS to reflect the results of additional ground verification. The resulting final unit pool now covers 3,769 acres and includes 112 units. The alternatives considered in detail in the Final EIS have been redesigned to be consistent with the 1997 TLMP. Appendix C of the Draft EIS provides a summary of the characteristics of all harvest units in the initial project unit pool (250 units). Unit and road cards were provided in Appendices F and G of the Draft EIS, and a sample of the integrated silvicultural prescriptions for an individual unit was provided in Appendix H of the Draft EIS. Many unit and road cards have been substantially revised since the Draft EIS; these are presented in Appendix D and Appendix E of the Final EIS, respectively.

Ecosystem Management

Prior to the completion of the revised Forest Plan (1997), the Control Lake Project team implemented ecosystem management by defining 20 landscape zones across the Project Area (see Draft EIS and Supplemental Draft EIS). They were based on a number of biological and social characteristics and were used in the development of alternatives and unit prescriptions and in assessing project effects. The landscape zonation was considered in the Forest Plan revision process, which defined new landscape zonation using LUDs. Because of the updated LUD mapping associated with the new Forest Plan, there is no longer a need to carry forward the landscape zonation used in early Control Lake Project planning.

Lower and Upper Cutthroat Lakes



Items Common to All Alternative Frameworks

The ID Team reviewed the ground-verified pool of units and allocated them to the alternative frameworks. Items common to the frameworks of all alternatives are identified below.

Each action alternative considered for detailed study meets the stated purpose and need of the project.

Each alternative complies with such Forest Service planning documents as the 1990 Resources Planning Act, the Alaska Regional Guide, and the TLMP (1997).

Each alternative complies with Sec. 103(e) of TTRA which states that the Secretary shall:

> . . . maintain a buffer zone of no less than 100 feet in width on each side of all Class I streams in the Tongass National Forest, and on those Class II streams which flow directly into Class I streams, within which commercial timber harvesting shall be prohibited. . .

Each alternative is consistent with the standards, guidelines, and land allocations of the 1997 TLMP. For example:

- Each individual unit proposed for harvest by any of the action alternatives meets the TLMP standards and guidelines for riparian management.
- No timber will be harvested within the 1,000-foot shoreline buffer (TLMP, 1997).
- Collectively, all units meet the TLMP objective to provide sufficient wildlife habitat to contribute to the maintenance of viable populations of wildlife species.
- All units and roads will meet the visual quality objectives (VQOs) adopted under the 1997 TLMP.

No individual harvest units include created openings exceeding 100 acres, thus each alternative complies with current regional direction in the Alaska Regional Guide, which states that:

> One-hundred acres is the maximum size of created openings to be allowed for the hemlock-Sitka spruce forest type of coastal Alaska, unless excepted under specific conditions. Recognizing that harvest units must be designed to accomplish management goals, created openings may be larger where larger units will produce a more desirable contribution of benefits.

This statement is designed to comply with legal limitations imposed on the maximum size of created openings as specified by the National Forest Management Act of 1976 (NFMA).

Ecosystem management opportunities were considered and are incorporated into all alternatives as described above. These opportunities are available both at the landscape level (e.g., a VCU, watershed, or viewshed) and at the stand level (e.g., individual harvest unit). Some of the opportunities that are responsive include:

Landscape level:

- maintaining large, unfragmented blocks of old-growth forest
- minimizing the amount of edge by designing larger harvest units
- identifying corridors that connect old-growth blocks and use beach and estuary fringe and stream buffers to the extent possible

Stand level:

- applying silvicultural prescriptions based on the individual stand characteristics and position of the unit in relationship to landscape zones
- retaining snags in harvest units (where safety regulations allow)
- retaining individual live reserve trees or small patches of live reserve trees in clearcuts
- using selection harvest systems for maintenance of visual quality and wildlife habitat
- using shelterwood harvest to maintain the cedar component
- maintaining large down logs in harvest units
- using silvicultural treatment of second growth to enhance wildlife habitat

No alternative proposes to harvest timber in any of the non-development LUDs including the Honker Divide Old-growth Reserve, the Rio Roberts Old-growth Reserve, the Election Creek Old-growth Reserve, the Rush Peak Old-growth Reserve, the Rio Roberts RNA, the Elevenmile Semi-remote Recreation Area, and the Thorne River/Hatchery Creek Scenic and Recreation River.

Alternatives Considered but Eliminated from Detailed Study

This section briefly describes alternatives that were considered but eliminated from detailed study. Alternatives 2, 3, 4, 5, 6, 7, 8, and 9 are eliminated from detailed study and receive no further discussion in this Final EIS. In the Draft EIS published in October 1995, Alternatives 2, 7, 8, and 9 were analyzed in detail in the main text and Alternatives 4 and 6 were analyzed in detail in Appendix B. Alternatives 10, 11 and 12 were analyzed in detail in the Supplemental Draft EIS that was published in January 1998.

Alternative 2

Alternative 2 was developed to provide the maximum timber volume that would have been allowed under full implementation of Alternative P of the TLMP Draft Revision (1991a). The harvest level would have been limited only by the application of the Forest Plan Management Prescriptions, Standards and Guidelines, and BMPs. The 250 units in this alternative represented the total initial project unit pool that remained after field investigation. Implementation of Alternative 2 resulted in the harvest of 9,409 acres producing approximately 233 MMBF of net sawlog and utility volume. This volume included approximately 12 MMBF from road right-of-way (ROW) clearing. It required approximately 218 miles of new road and 8 miles of reconstructed road to access the harvest units. This alternative was considered in detail in the Draft EIS, but was deleted from detailed study in the Supplemental Draft EIS and Final EIS because of the degree of inconsistency it would have with the 1997 TLMP.

Alternative 3

Alternative 3 was referred to as the Proposed Action during scoping and was included on the map accompanying the scoping package. The chosen units were widely distributed across the Project Area. They were intended to draw attention to sensitive areas and demonstrate that all areas available for harvest under the Forest Plan were under consideration in order to solicit scoping comments. This alternative resulted in 137 harvest units providing 173 MMBF of net sawlog plus utility volume. This volume included approximately 7 MMBF from road ROW clearing. This alternative was not considered in detail because the choice and distribution of units did not form logical groups for harvest and did not respond to specific issues developed during scoping.

Alternative 4

The framework for Alternative 4 emphasizes timber economics and conventional cable yarding methods. Criteria include 1 MMBF of timber volume per mile of road and no helicopter units except when they are immediately adjacent to the road system. Units with a large component of Alaska yellow cedar were included. It emphasizes a positive net economic return for the proposed harvest units by attempting to minimize logging and road construction costs. This alternative resulted in 105 harvest units on 4,555 acres providing 129 MMBF of net sawlog plus utility volume. This volume included approximately 5 MMBF from road ROW clearing. It required 96 miles of road to access the harvest units. This alternative was not considered in detail because it would reduce the economic viability of future entries. By harvesting only the highest volume units in this entry, subsequent entries would be less economically viable. More information on this alternative was presented in Appendix B of the Draft EIS.

Alternative 5

Alternative 5 used landscape zones as a basis for alternative design. It maintained the value and function of zones of highest concern or sensitivity. No harvest was scheduled in Honker Divide "ridge-to-ridge," north of Forest Road 30, within the Rio Roberts Watershed, and the Western Peninsula (Elevenmile Area). All other areas would be entered at the Forest Plan implementation level. This alternative resulted in 62 harvest units on 2,281 acres providing 68 MMBF of net sawlog plus utility volume. This volume included approximately 2 MMBF from road ROW clearing. It required 59 miles of road to access the harvest units. This alternative was not considered in detail because it is similar to Alternatives 6 and 10, which respond to similar issues.

Alternative 6

Like Alternative 5, this alternative used landscape zones as a basis for design. Harvest was scheduled to maintain the function of all landscape zones throughout a harvest rotation. It scheduled timber harvest in all landscape zones except old growth blocks. Regeneration harvests were scheduled to evenly meter out removal of remaining suitable old growth over time. This alternative resulted in 99 harvest units on 4,021 acres providing 106 MMBF of net sawlog plus utility volume. This volume included approximately 4 MMBF from road ROW clearing. It required 93 miles of road to access the harvest units. This alternative was not considered in detail because of the degree of inconsistency it would have with the 1997 TLMP and because most of its framework is captured by Alternatives 10 and 11. However, more information on this alternative was presented in Appendix B of the Draft EIS.

Alternative 7

Alternative 7 sought to provide 187 MMBF while responding to scoping concerns related to entry into the Western Peninsula and Upper Rio Roberts Watershed. It allowed no entry into these two areas of concern, but included all units within the project unit pool from other areas, including the Honker Divide. It resulted in the harvest of 7,399 acres in 197 harvest units providing approximately 180 MMBF of net sawlog and utility volume. This volume included approximately 9 MMBF from road ROW clearing. Alternative 7 required approximately 173 miles of new road and 8 miles of reconstructed road to access the harvest units. This alternative was considered in detail in the Draft EIS, but has been deleted from detailed study in the Supplemental Draft EIS because of the degree of inconsistency it would have with the 1997 TLMP Revision, particularly in the Honker Divide.

Alternative 8

This alternative sought to provide 187 MMBF while responding to scoping concerns related to entry into the core of the Honker Divide area and most of the Western Peninsula. The alternative would harvest all potential units in the initial project unit pool except for a core group in the Honker Divide area. It resulted in the harvest of 7,107 acres in 186 harvest units providing approximately 184 MMBF of net sawlog and utility volume. This volume included approximately 9 MMBF from road ROW clearing. Alternative 8 required approximately 169 miles of new road and 8 miles of existing road needing reconstruction. This alternative was considered in detail in the Draft EIS, but has been deleted from detailed study in the Supplemental Draft EIS because of inconsistency it would have with the 1997 TLMP Revision.

Alternative 9

Alternative 9 was designed to minimize harvest in the Honker Block, avoid harvest in the Rio Roberts corridor, minimize harvest in the Western Peninsula, and allow harvest at the full implementation level of Alternative P in the TLMP Draft Revision (1991a). It resulted in the harvest of 5,123 acres in 135 harvest units providing approximately 130 MMBF of net sawlog and utility volume. This volume included approximately 6 MMBF from road ROW clearing. Alternative 9 required approximately 115 miles of new road and 8 miles of road reconstruction. This alternative was considered in detail in the Draft EIS, but has been deleted from detailed study in the Supplemental Draft EIS because of inconsistency it would have with the 1997 TLMP Revision.

Alternatives Considered in Detail

Five alternatives are considered in detail. Alternative 1 would not implement any action alternatives; the Control Lake Project Area would remain subject to natural changes only. This alternative represents the existing condition with which all other alternatives are compared. Alternatives 10, 11, 12, and 13 represent different means of satisfying the purpose and need by harvesting timber while responding with different emphasis to the various issues.

Foldout color maps of all alternatives considered in detail are provided at the end of Chapter 2. A foldout color map showing the access strategy for the action alternatives is also provided at the end of Chapter 2. Additionally, a large-scale map of the Project Area with all units and roads in the revised unit pool is included with the Record of Decision (ROD). Large-scale maps of these alternatives are also available in the Project Planning Record.

Alternative 1 Framework (No Action)

Alternative 1, also called the No Action Alternative, would result in no timber (No Action) harvest or road construction in the Control Lake Project Area that is additional to the timber harvest already cleared by the 1989-1994 EIS. Under this alternative, replacement timber volume would probably not be available from somewhere else within the Ketchikan Area at this time. This alternative serves as a baseline against which to measure the effects of the action alternatives.

Resource Outputs

There are no new timber harvest outputs associated with this alternative.

Economic Outputs

Because Alternative 1 would result in no new timber harvest or road construction beyond that which is already approved, there would be no timber-related economic outputs. Additional receipts to the State of Alaska would be foregone and no new timber jobs would be created.

Environmental Consequences

A summary of the environmental consequences of implementing Alternative 1 by significant issue is presented below.

Issue 1—Honker Divide

Under Alternative 1, no further road building or timber harvest would occur in the Honker Divide area. Recreational and subsistence access to the area and values would remain the same as at present. The Thorne River/Hatchery Creek canoe route would remain isolated. The high wildlife habitat value of this area associated with the large unfragmented block of old growth would remain the same as at present.

Issue 2—Recreation and Visual Quality

Under Alternative 1, visual quality and recreation and tourism opportunities would remain unchanged in the Project Area.

Issue 3—Subsistence

Subsistence use of the Project Area would be affected only by previous timber harvest and road development under Alternative 1. No timber harvest or road construction would occur in the 25,723 cumulative acres of subsistence use areas in the Project Area used by 15 percent or more of a rural community's households.

A significant possibility of a significant restriction of subsistence use of deer, black bear, and marten may occur in some areas related to past timber harvest, road developments, and high demand.

Issue 4—Wildlife Habitat and Biodiversity

All effects on habitat and biodiversity would be avoided, resulting in no change from existing conditions except for those changes resulting from natural factors such as plant succession.

Issue 5—Fish Habitat and Water Quality

No effects on fish habitat or water quality are expected other than those caused by two factors independent of the Control Lake Project. First, there would be continued slight degradation of fish habitat resulting from lack of large woody debris recruitment caused by past timber harvesting to the stream bank. Second, existing fish habitat enhancement projects are expected to result in increased fish habitat capability.

Issue 6—Timber Economics and Supply

Alternative 1 would result in no timber-related economic outputs and therefore would not provide any direct return to the U.S. Treasury. The current timber supply in the Control Lake Project Area would be unaffected. No economic return to the State of Alaska due to timber harvest would occur. No timber jobs would be created in the Control Lake Project Area until another timber project is evaluated and implemented.

Lack of timber harvest activity in the Project Area would likely result in a shortage of supply for log processing facilities and economic impacts on Prince of Wales Island residents and independent timber contractors. Economic impacts would most likely occur to several residents of Thorne Bay, Coffman Cove, Craig, Klawock, Naukati, and Ketchikan who depend directly or indirectly on timber harvesting on Prince of Wales Island.

Approximately 22,786 acres of suitable old growth would remain in the Project Area after implementation of Alternative 1.

Issue 7—Karst and Cave Resources

Alternative 1 would have no effect on the karst or cave resources of the Project Area.

Alternative 10 Framework

This alternative does not schedule harvest in the Honker Divide ("ridge-to-ridge") north of Forest Road 30, in the upper Logjam Creek area, in Rio Roberts Watershed, or in the Western Peninsula. It uses a harvest scheduling process similar to that described in Alternative 6. Alternative 10 attempts to emphasize community-based, value-added products by choosing units that would be more easily harvested by independent and small operators. Units in this alternative minimize road construction, are smaller, and use conventional logging systems. This alternative was independently developed by a group consisting of environmental organization representatives, independent timber contractors, Alaska natives, educators, business owners, and fishermen, most of which are residents of Prince of Wales Island.

Resource Outputs

Implementation of Alternative 10 would result in the harvest of 964 acres in 31 harvest units producing approximately 26 MMBF of net sawlog and utility volume. This volume includes approximately 2 MMBF from road ROW clearing. Average unit size would be about 31.1 acres and no units would have openings exceeding 100 acres. Of this harvest, 639 acres are planned for partial cut; the remaining 325 acres are planned for clearcut harvest. The retention of reserve trees is planned (to varying degrees) for all units proposed for clearcutting. To implement this harvest, approximately 19 miles of road would be constructed and 2 miles would be reconstructed.

Preliminary implementation planning indicates that Alternative 10 would be sold in 11 sales ranging in size from 0.2 to 5.5 MMBF.

No new LTFs would be needed. Timber harvest would be hauled to existing facilities at Klawock, Winter Harbor, Naukati, or elsewhere.

Economic Outputs

Preliminary economic analysis indicates that Alternative 10 would produce an overall net stumpage value of $75.83 per MBF at high market timber values. The present net value (PNV) of Alternative 10 was estimated to be $0.4 million. Payments to the State of Alaska resulting from Alternative 10 were estimated at $1.4 million. Average annual direct jobs created were estimated at 39 over 4 years.

Environmental Consequences

A summary of the environmental consequences of implementing Alternative 10 by significant issue is presented below.

Issue 1—Honker Divide

No changes to the unroaded character of the Honker Divide would occur. Overall roaded access and related recreation and subsistence use would not increase. The Thorne River/Hatchery Creek canoe route would remain isolated.

Issue 2—Recreation and Visual Quality

Changes in the visual quality of the West Coast Waterway would be very slight. Changes in the visual quality from the Control Lake Cabin would be slight. No changes in the visual quality from the Eagle's Nest Campground (Balls Lake) would occur. Changes in the visual quality along the Forest Highway #9 (30 Road) corridor would be slight to moderate. No changes in the visual quality from the Cutthroat Lakes area would occur. No changes in the visual quality of the sensitive viewshed along the Thorne River-Hatchery Creek Canoe Route would occur.

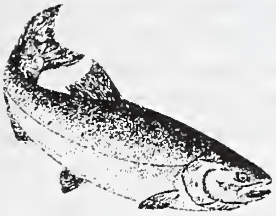
Timber harvest would have minimal effects on existing and potential recreation sites. Timber harvest and road construction would result in a change of approximately 7,124 acres from unroaded to roaded Recreation Opportunity Spectrum (ROS) settings.

Issue 3—Subsistence

Based on the wildlife analysis and existing harvest levels, deer habitat capability may be below that needed to support current total harvest levels, but would be above that needed to support rural harvests, indicating that there may be a need to restrict nonsubsistence users.

Black bear and marten habitat capabilities may also be below needed populations in some areas and close to needed populations for the Project Area as a whole.

No roads would be built within 5 miles of the Elevenmile shoreline, which is an important subsistence use area. After implementation of Alternative 10, open road density would be reduced from 0.57 to 0.40 miles per square mile for the Project Area.



Issue 4—Wildlife Habitat and Biodiversity

The major effect would be the harvest of 964 acres of wildlife habitats. This includes 834 acres of mapped old-growth forest habitat (Volume Strata high, medium, and low) or about 1 percent of the remaining old growth.

The 21 miles of road construction/reconstruction would temporarily provide new access into unroaded areas; however, road closures following harvest would minimize this effect and closures of existing roads would actually decrease road density compared with existing conditions. Because no new LTFs or logging camps would be required, additional habitat and disturbance impacts from these sources would be avoided.

Under the Forest Plan, the expanded use of no-harvest LUDs would create an extensive old-growth retention strategy that would provide connectivity across northern Prince of Wales Island. Alternative 10 would not conflict with this strategy.

Sitka black-tailed deer habitat capability would be reduced about 0.4 percent after 25 years post-harvest; about 18 acres of high quality winter range would be harvested.

Threatened or endangered species would not be affected.

Issue 5—Fish Habitat and Water Quality

No measurable effects on fish and water quality are expected due to implementation of TTRA buffers, additional-width buffers, BMPs, and other mitigation measures. Measures of potential risk to water quality and fish habitat are as follows: (1) a soil disturbance index of 270 acres was estimated due to timber harvest and road construction; (2) 468 acres of high hazard soils and 0 acres of very high hazard soils would be harvested; (3) no harvest of riparian area would occur. Additionally, roads would cross 9 Class I, 10 Class II, and 43 Class III/IV streams.

Issue 6—Timber Economics and Supply

Preliminary economic analysis indicates an overall net stumpage value of $75.83/MBF at high market timber values. The PNV associated with this alternative is $0.4 million.

Approximately 21,952 acres of suitable old-growth would remain in the Project Area after implementation of Alternative 10.

Issue 7—Karst and Cave Resources

No harvest units or roads in this alternative were identified during field surveys as occurring on karst.

Alternative 11 Framework

This alternative was designed to be completely consistent with the 1997 Forest Plan Revision. It avoids harvest within all of the Old-Growth Habitat and Semi-Remote Recreation LUDs including the Honker Divide area, Rio Roberts Watershed, most of the Western Peninsula, and other areas. Alternative 11 reflects collaborative efforts between the Forest Service and other state and federal agencies.

Resource Outputs

If Alternative 11 were implemented, it would result in the harvest of 2,980 acres in 91 harvest units producing approximately 71 MMBF of new sawlog and utility volume. This volume includes approximately 4 MMBF from road ROW clearing. Average unit size would be about 32.7 acres and no units have openings would exceeding 100 acres. Of this harvest, 2,348 acres are planned for partial cut; the remaining 632 acres are planned for clearcut harvest. The retention of reserve trees is planned to varying degrees for all units proposed for clearcutting. To implement this harvest, approximately 57 miles of road would be constructed and 5 miles would be reconstructed.

Preliminary implementation planning indicates that Alternative 11 would be sold in 18 sales ranging in size from 0.2 to 11.2 MMBF.

No new LTFs would be needed. Timber harvest would be hauled to existing facilities at Klawock, Winter Harbor, Naukati, or elsewhere.

Economic Outputs

Preliminary economic analysis indicates that Alternative 11 would produce an overall net stumpage value of $50.80 per MBF at high market timber values. The PNV of Alternative 11 was estimated to be -$1.0 million. Payments to the State of Alaska resulting from Alternative 11 were estimated at $3.5 million. Average annual direct jobs created were estimated at 117 over 4 years.

Environmental Consequences

A summary of the environmental consequences of implementing Alternative 11 by significant issue is presented below.

Issue 1—Honker Divide

No changes to the unroaded character of the Honker Divide would occur. Overall roaded access and related recreation and subsistence use would not increase. The Thorne River/Hatchery Creek canoe route would remain isolated but with a slight additional potential for wilderness-oriented recreationists to hear logging operations in the short-term and compete with road-oriented recreationists over the long-term.

Issue 2—Recreation and Visual Quality

Changes in the visual quality of the West Coast Waterway would be slight. Changes in the visual quality from the Control Lake Cabin would be low. Changes in the visual quality from the Eagle's Nest Campground (Balls Lake) would be low. Changes in the visual quality along Forest Highway #9 (30 Road) corridor would be slight to moderate. There would be no changes in the visual quality from the Cutthroat Lakes area. Changes in the visual quality of the sensitive viewshed along the Thorne River-Hatchery Creek Canoe Route would be low.

Timber harvest would have minimal effects on existing and potential recreation sites. Timber harvest and road construction would result in a change of approximately 27,506 acres from unroaded to roaded ROS settings.

Issue 3—Subsistence

Based on the wildlife analysis and existing harvest levels, deer habitat capability may be below that needed to support current total harvest levels, but would be above that needed to support rural harvests, indicating that there may be a need to restrict nonsubsistence users.

Black bear and marten habitat capabilities may also be below needed populations in some areas and close to needed populations for the Project Area as a whole.

No roads would be built within 3 miles of the Elevenmile shoreline, which is an important subsistence use area. After implementation of Alternative 11, open road density would be reduced from 0.57 to 0.41 miles per square mile for the Project Area.

Issue 4—Wildlife Habitat and Biodiversity

The major effect would be the harvest of 2,980 acres of wildlife habitats. This includes 2,606 acres of mapped old-growth forest habitat (Volume Strata high, medium, and low) or about 3 percent of the remaining old growth.

The 62 miles of road construction/reconstruction would temporarily provide new access into unroaded areas; however, road closures following harvest would minimize this effect and closures of existing roads would actually decrease road density compared with existing conditions. Because no new LTFs or logging camps would be required, habitat and disturbance impacts from these sources would be avoided.

Under the Forest Plan, the expanded use of no-harvest LUDs would create an extensive old-growth strategy that would provide connectivity across northern Prince of Wales Island. Alternative 11 would not include the harvest of any units or road construction that would conflict with this strategy.

Sitka black-tailed deer habitat capability would be reduced by about 1.8 percent after 25 years post-harvest; and 222 acres of high quality winter range would be harvested.

Threatened or endangered species would not be affected.

The 1997 TLMP further subdivided Class III streams into Class III and Class IV streams. See the Glossary for the current definitions.

Issue 5—Fish Habitat and Water Quality

No measurable effects on fish and water quality are expected due to implementation of TTRA buffers, additional-width buffers, BMPs, and other mitigation measures. Measures of potential risk to water quality and fish habitat are as follows: (1) a soil disturbance index of 768 acres was estimated due to timber harvest and road construction; (2) 1,168 acres of high hazard soils and 0 acres of very high hazard soils would be harvested; (3) no harvest of riparian area would occur. Additionally, roads would cross 30 Class I, 25 Class II, and 120 Class III/IV streams.

Issue 6—Timber Economics and Supply

Preliminary economic analysis indicates an overall net stumpage value of $50.80/MBF based on high market timber values. The PNV associated with this alternative is -$1.0 million.

Approximately 20,180 acres of suitable old growth would remain in the Project Area after implementation of Alternative 11.

Issue 7—Karst and Cave Resources

About 10 acres of units and roads in this alternative are on low-to-moderate vulnerability karst. No known caves or other significant features are included within the unit boundaries. No measurable effects on karst resources are expected due to implementation of mitigation measures.

Alternative 12 Framework

This alternative was designed to provide a maximum level of harvest consistent with the Forest Plan. It avoids harvest within all of the Old-Growth Habitat and Semi-Remote Recreation LUDs including the Honker Divide area, Rio Roberts Watershed, most of the Western Peninsula, and other areas.

Resource Outputs

If Alternative 12 were implemented, it would result in the harvest of 3,769 acres in 112 harvest units producing approximately 86 MMBF of net sawlog and utility volume. This volume includes approximately 4 MMBF from road ROW clearing. Average unit size would be about 33.7 acres and no units would have openings exceeding 100 acres. Of this harvest, 3,082 acres are planned for partial cut; the remaining 687 acres are planned for clearcut harvest. The retention of reserve trees is planned to varying degrees for all units proposed for clearcutting. To implement this harvest, approximately 77 miles of road would be constructed and 7 miles would be reconstructed.

Preliminary implementation planning indicates that Alternative 12 would be sold in 20 sales ranging in size from 0.2 to 11.2 MMBF.

No new LTFs would be needed. Timber harvest would be hauled to existing facilities at Klawock, Winter Harbor, Naukati, or elsewhere.

Economic Outputs

Preliminary economic analysis indicates that Alternative 12 would produce an overall net stumpage value of $37.98 per MBF at high market timber values. The PNV of Alternative 12 was estimated to be -$2.6 million. Payments to the State of Alaska resulting from Alternative 12 were estimated at $4.3 million. Average annual direct jobs created were estimated at 143 over 4 years.

Environmental Consequences

A summary of the environmental consequences of implementing Alternative 12 by significant issue is presented below.

Issue 1—Honker Divide

Only slight changes to the unroaded character of the Honker Divide would occur. Overall roaded access and related recreation and subsistence use would increase slightly. The Thorne River/Hatchery Creek canoe route would remain isolated but with a slight additional potential for wilderness-oriented recreationists to hear logging operations in the short-term and compete with road-oriented recreationists over the long-term.

Issue 2—Recreation and Visual Quality

Changes in the visual quality of the West Coast Waterway would be slight. Changes in the visual quality from the Control Lake Cabin would be low. Changes in the visual quality from the Eagle's Nest Campground (Balls Lake) would be low. Changes in the visual quality along Forest Highway #9 (30 Road) corridor would be slight to moderate. There would be no changes in the visual quality from the Cutthroat Lakes area. Changes in the visual quality of the sensitive viewshed along the Thorne River-Hatchery Creek Canoe Route would be low.

Timber harvest would have minimal effects on existing and potential recreation sites. Timber harvest and road construction would result in a change of approximately 36,119 acres from unroaded to roaded ROS settings.

Issue 3—Subsistence

Based on the wildlife analysis and existing harvest levels, deer habitat capability may be below that needed to support current total harvest levels, but would be above that needed to support rural harvests, indicating that there may be a need to restrict nonsubsistence users.

Black bear and marten habitat capabilities may also be below needed populations in some areas and close to needed populations for the Project Area as a whole.

Roads would be built to within 1 mile of the Elevenmile shoreline, potentially creating conflicts between traditional subsistence users and new road-based users of this important subsistence area. After implementation of Alternative 12, open road density would be reduced from 0.57 to 0.47 miles per square mile for the Project Area.

Issue 4—Wildlife Habitat and Biodiversity

The major effect would be the harvest of 3,769 acres of wildlife habitats. This includes 3,328 acres of mapped old-growth forest habitat (Volume Strata high, medium, and low) or about 4 percent of the remaining old growth.

The 84 miles of road construction/reconstruction would temporarily provide new access into unroaded areas; however, road closures following harvest would minimize this effect and closures of existing roads would actually decrease road density compared with existing conditions. Because no new LTFs or logging camps would be required, habitat and disturbance impacts from these sources would be avoided.

Under the Forest Plan, the expanded use of no-harvest LUDs would create an extensive old-growth strategy that would provide connectivity across northern Prince of Wales Island. Alternative 12 would not include the harvest of any units or road construction that would conflict with this strategy.

Sitka black-tailed deer habitat capability would be reduced about 2.5 percent after 25 years post-harvest; about 358 acres of high quality winter range would be harvested.

Threatened or endangered species would not be affected.

Issue 5—Fish Habitat and Water Quality

No measurable effects on fish and water quality are expected due to implementation of TTRA buffers, additional-width buffers, BMPs, and other mitigation measures. Measures of potential risk to water quality and fish habitat are as follows: (1) a soil disturbance index of 1,010 acres was estimated due to timber harvest and road construction; (2) 1,394 acres of high hazard soils and 0 acres of very high hazard soils would be harvested; (3) no harvest of riparian area would occur. Additionally, roads would cross 41 Class I, 31 Class II, and 144 Class III/IV streams.

Issue 6—Timber Economics and Supply

Preliminary economic analysis indicates an overall net stumpage value of $37.98/MBF based on high market timber values. The PNV associated with this alternative is -$2.6 million.

Approximately 19,458 acres of suitable old growth would remain in the Project Area after implementation of Alternative 12.

Issue 7—Karst and Cave Resources

About 10 acres of units and roads in this alternative are on low-to-moderate vulnerability karst. No known caves or other significant features are included within the unit boundaries. No measurable effects on karst resources are expected due to implementation of mitigation measures.

Alternative 13 Framework

This alternative represents ongoing collaborative efforts between the Forest Service and state and other federal agencies. It also is responsive to the public comments received on the Supplemental Draft EIS, and numerous meetings with communities, groups, and individuals since issuance of the Supplemental Draft EIS. Alternative 13 was formed by combining elements of Alternatives 10 and 11 based on public comments. Alternative 13 defers harvest in the Elevenmile area, the Rio Roberts watershed, and the area north of the 30 Road in the vicinity of Rio Beaver Creek.

Resource Outputs

If Alternative 13 were implemented, it would result in the harvest of 2,577 acres in 79 harvest units producing approximately 61 MMBF of new sawlog and utility volume. This volume includes approximately 3 MMBF from road ROW clearing. Average unit size would be about 32.6 acres and no units would have created openings greater than 100 acres. Of this harvest, 1,955 acres are planned for partial cut; the remaining 622 acres are planned for clearcut with reserve tree harvest. The retention of reserve trees is planned to varying degrees for all units proposed for clearcutting. To implement this harvest, approximately 42 miles of road would be constructed and 4 miles would be reconstructed.

Preliminary implementation planning indicates that Alternative 13 would be sold in 18 sales ranging in size from 0.2 to 11.2 MMBF.

No new LTFs would be needed. Timber harvest would be hauled to existing facilities at Klawock, Winter Harbor, Naukati, or elsewhere.

Economic Outputs

Preliminary economic analysis indicates that Alternative 13 would produce an overall net stumpage value of $64.33 per MBF at high market timber values. The PNV of Alternative 13 was estimated to be -$0.1 million. Payments to the State of Alaska resulting from Alternative 13 were estimated at $2.9 million. Average annual direct jobs created were estimated at 100 over 4 years.

Environmental Consequences

A summary of the environmental consequences of implementing Alternative 13 by significant issue is presented below.

Issue 1—Honker Divide

No changes to the unroaded character of the Honker Divide would occur. Overall roaded access and related recreation and subsistence use would not increase. The Thorne River/ Hatchery Creek canoe route would remain isolated but with a slight additional potential for wilderness-oriented recreationists to hear logging operations in the short-term and compete with road-oriented recreationists over the long-term.

Issue 2—Recreation and Visual Quality

Changes in the visual quality of the West Coast Waterway would be slight. Changes in the visual quality from the Control Lake Cabin would be low. Changes in the visual quality from the Eagle's Nest Campground (Balls Lake) would be low. Changes in the visual quality along Forest Highway #9 (30 Road) corridor would be slight to moderate. There would be no changes in the visual quality from the Cutthroat Lakes area. Changes in the visual quality of the sensitive viewshed along the Thorne River/Hatchery Creek Canoe Route would be low.

Timber harvest would have minimal effects on existing and potential recreation sites. Timber harvest and road construction would result in a change of approximately 23,536 acres from unroaded to roaded ROS settings.

Issue 3—Subsistence

Based on the wildlife analysis and existing harvest levels, deer habitat capability may be below that needed to support current total harvest levels, but would be above that needed to support rural harvests, indicating that there may be a need to restrict nonsubsistence users.

Black bear and marten habitat capabilities may also be below needed populations in some areas and close to needed populations for the Project Area as a whole.

No roads would be built within 5 miles of the Elevenmile shoreline, which is an important subsistence use area. After implementation of Alternative 13, open road density would be reduced from 0.57 to 0.41 miles per square mile for the Project Area.

Issue 4—Wildlife Habitat and Biodiversity

The major effect would be the harvest of 2,577 acres of wildlife habitats. This includes 2,244 acres of mapped old-growth forest habitat (Volume Strata high, medium, and low) or about 3 percent of the remaining old growth.

The 46 miles of road construction would temporarily provide new access into unroaded areas; however, road closures following harvest would minimize this effect and closures of existing roads would actually decrease road density compared with existing conditions. Because no new LTFs or logging camps would be required, habitat and disturbance impacts from these sources would be avoided.

Under the 1997 TLMP Revision, the expanded use of no-harvest LUDs would create an extensive old-growth strategy that would provide connectivity across northern Prince of Wales Island. Alternative 13 would not include the harvest of any units or road construction that would conflict with this strategy.

Sitka black-tailed deer habitat capability would be reduced about 1.3 percent after 25 years post-harvest; and about 95 acres of high quality winter range would be harvested.

Threatened or endangered species would not be affected.

Issue 5—Fish Habitat and Water Quality

No measurable effects on fish and water quality are expected due to implementation of TTRA buffers, additional-width buffers, BMPs, and other mitigation measures. Measures of potential risk to water quality and fish habitat are as follows: (1) a soil disturbance index of 597 acres was estimated due to timber harvest and road construction; (2) 1,100 acres of high hazard soils and 0 acres of very high hazard soils would be harvested; (3) no harvest of riparian area would occur. Additionally, roads would cross 17 Class I, 14 Class II, and 95 Class III/IV streams.

Log tow

Issue 6—Timber Economics and Supply

Preliminary economic analysis indicates an overall net stumpage value of $64.33/MBF based on high market timber values. The PNV associated with this alternative is -$0.1 million.

Approximately 20,542 acres of suitable old growth would remain in the Project Area after implementation of Alternative 13.

Issue 7—Karst and Cave Resources

About 10 acres of units and roads in this alternative are on low-to-moderate vulnerability karst. No known caves or other significant features are included within the unit boundaries. No measurable effects on karst resources are expected due to implementation of mitigation measures.

Comparison and Evaluation of Alternatives

This section presents the environmental consequences of the alternatives in a comparative format. First, the alternatives are compared and evaluated relative to the significant issues identified in Chapter 1. Then at the end of this section, three tables are presented. In the first one, a summary of the physical and economic outputs of the alternatives are presented in Table 2-1. Next, the environmental consequences of the alternatives are summarized in Table 2-2. Finally, site-specific mitigation measures are summarized in Table 2-3. All numbers presented in these tables are either absolute or relative to Alternative 1 as indicated. For more detailed descriptions of the affected environment and the environmental consequences of the alternatives, refer to Chapters 3 and 4, respectively.

Issue 1—Honker Divide

Under Alternatives 10, 11, and 13, changes to the unroaded character of the Honker Divide would not occur; the unroaded character would be only slightly affected under Alternative 12. Therefore, roaded access and related recreation and subsistence use would increase very slightly under Alternative 12, but remain nearly unchanged under Alternatives 10, 11, and 13.

For Alternatives 11, 12, and 13, there would be some potential for recreationists using the Thorne River/Honker Divide canoe route to hear logging activities. This potential is highest in Alternative 12.

The high wildlife habitat value of this area associated with the large unfragmented block of old growth would not be reduced under Alternatives 10, 11, and 13, and would be very slightly reduced under Alternative 12.

Issue 2—Recreation and Visual Quality

During the Project Area visual assessment, 11 Priority Travel Routes and Use Area viewsheds were identified. Among these, 6 are considered important for comparison because of their visual sensitivity and the presence of harvest units within them. The degree of change in the visual quality from these Priority Travel Routes and Use Areas is considered in relationship to the number of harvest units potentially affecting them. The visual quality effects associated with all of these Priority Travel Routes and Use Areas is low to moderate and falls within standards and guidelines. Changes in the visual quality along Forest Highway #9/30 Road would be highest with Alternative 12, lowest with Alternative 10, and intermediate with Alternatives 11 and 13.

The alternatives would have minimal effects on existing and potential recreation sites. All action alternatives would result in a reduction in the area of unroaded ROS settings, with Alternative 12 having the largest change and Alternative 10 having the smallest. For Alternative 12, timber harvest and road construction would result in a change of approximately 36,119 acres of unroaded to roaded ROS settings. For Alternative 10, timber harvest and road construction would result in a change of approximately 7,124 acres from unroaded to roaded ROS settings.

Issue 3—Subsistence

Deer hunting is the major aspect of subsistence use that is affected by timber harvest. Based on the wildlife analysis, Sitka black-tailed deer habitat capability in the Project Area WAAs would be reduced from 0.2 to 1.2 percent after 25 years by the action alternatives. Alternative 12 would have the greatest effect and Alternative 10 would have the least effect. Alternative 1 would result in no change. In all cases, current total deer harvest levels in the Project Area would be greater than 10 percent of estimated habitat capability. Under all alternatives, including Alternative 1, there may be a significant possibility of significant restriction of subsistence use of Sitka black-tailed deer by the residents of most local communities in the future.

Black bear and marten habitat capabilities appear to be below needed populations in some areas and close to needed populations for the Project Area as a whole under all alternatives including Alternative 1.

Issue 4—Wildlife Habitat and Biodiversity

The major effects on wildlife habitats in all action alternatives are the reduction of old-growth forest habitat and the increased access provided by the construction or reconstruction of roads into presently unroaded areas. Alternative 12 would harvest 3,328 of old-growth habitat and Alternative 10 would harvest 834 acres. Alternatives 11 and 13 would harvest 2,606 and 2,244 acres respectively.

Alternative 12 would result in the greatest effects on old-growth habitat and effects due to increased access, while Alternative 10 would result in the least among the action alternatives. All alternatives would result in impacts consistent with the implementation of TLMP (1997).

Issue 5—Fish Habitat and Water Quality

No measurable effects on fish habitat or water quality are expected under any of the alternatives. All alternatives meet the requirement and intent of the Clean Water Act. Implementation of identified fish habitat enhancement opportunities could increase habitat for fish production. Implementation of TTRA-required stream buffers, additional-width buffers per the Forest Plan Standards and Guidelines, and BMPs and other relative mitigation measures would effectively mitigate fish habitat and water quality impacts.

Most major watersheds in the Project Area have experienced prior road construction and timber harvest. Reentering these drainages may generate a greater potential risk of impacts on water quality, with the risk expected to be greater in those watersheds with the higher cumulative harvest percentages. Based on the analysis presented here, none of the alternatives are expected to produce significant watershed effects; the risk of effects would be highest under Alternative 12 and lowest under Alternative 10.

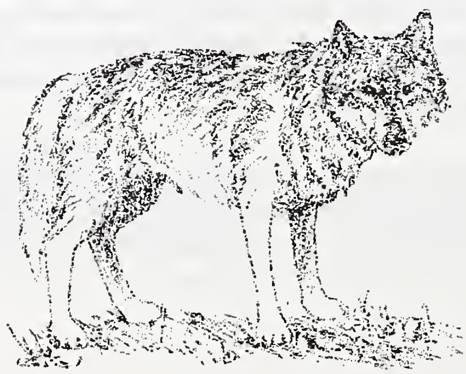
Measures of potential risk to water quality and fish habitat are: (1) an index of the amount of soil disturbance, which is related to the area harvested, the logging systems used, and the area disturbed during road construction; (2) the amount of harvest on slopes with a high mass movement index; (3) the amount of riparian area harvested outside of no-cut buffers and the number of Class I, II, and III/IV stream road crossings. These measures are quantified in Table 2-2. Review of Table 2-2 indicates that Alternative 10 ranks lowest and Alternative 12 ranks highest in these measures of potential risk.

Potential effects on marine habitats and organisms would also be lowest under Alternative 10 and highest under Alternative 12 in proportion to timber volume that could be transported to existing LTFs.

Issue 6—Timber Economics and Supply

Preliminary economic analysis indicates that overall net stumpage values would be positive for all action alternatives using high market timber prices (Table 2-1). Alternative 12 has the lowest stumpage value, and Alternative 10 has the highest (Table 2-1). Alternatives 10 and 13 have the highest PNVs. Alternative 12 has the highest payment to the State of Alaska followed by Alternatives 11, 13, and 10. Alternative 12 would create the highest number of jobs followed by Alternatives 11, 13, and 10.

Timber supply analysis indicates the distribution between geographic areas on Prince of Wales Island is expected to change from patterns of past harvest. Future harvest will shift away from the northern and north-central road systems and towards the south-central and isolated areas. This is expected to decrease the timber harvest levels available for communities in the northern half of Prince of Wales Island that are dependent on harvest from National Forest System lands. Likewise, communities in the southern half and isolated areas of Prince of Wales Island could expect an increase in timber harvest levels in the future.



As indicated in Chapter 4, and depending on the amount of site-specific mitigation needed to meet resource objectives, the Project Area could provide entries of 35 to 75 MMBF per decade after implementation of the Control Lake Timber Sales from old-growth timber alone for the next 5 decades.

Issue 7—Karst and Cave Resources

Within the total unit pool of harvest units, three units include low-to-moderate vulnerability karst; there are no units that are rated as high vulnerability. The potential extent of affected karst within the harvest units is about 10 acres for Alternatives 11, 12, and 13, and none for Alternative 10. Specific mitigation measures to minimize the potential for adverse effects have been prescribed for all three units.

Mitigation Measures

The Forest Plan presents management prescriptions for each land use designation and Forest-wide standards and guidelines which are to be followed in the development of mitigation measures. Likewise, the plans provide forest management goals and objectives but do not contain project decisions. The analysis supporting this EIS discloses possible adverse impacts that are specific to the locality and to the actions proposed. Therefore, measures were formulated to mitigate these impacts guided by forest management goals and objectives, under the overall direction given by the proposed land use designation management prescriptions, and following the proposed Forest-wide standards and guidelines.

Most of these measures are harvest unit- or road-specific, but many of these measures result in the complete elimination or deferral of harvest from geographic areas. These broad measures are identified and discussed first, followed by a summary of the site-specific measures. Mitigation measures are described in more detail in the appropriate sections of Chapter 4. Unit-specific mitigation measures are summarized by harvest unit in Appendix C. These are described in greater detail on the unit cards in Appendix D of this Final EIS.

Site-Specific Mitigation Measures

A wide variety of site-specific mitigation measures designed primarily to avoid or minimize adverse impacts, have been evaluated and incorporated into harvest unit and road design, preliminary layout, and would be incorporated into final layout and timber sale implementation. These measures are summarized in Table 2-3 along with the number of harvest units affected for each alternative. A specific listing of each unit affected by each measure is provided in Appendix C. A description of the mitigation measures for each unit and road segment is provided in the unit and road cards in Appendices D and E of this Final EIS.

In addition to the site-specific measures listed in these tables, a variety of other site-specific measures would apply to all harvest and construction activities and would be incorporated into timber harvest unit and road design. These measures include all appropriate BMPs not specifically identified in the table. Direction for use of BMPs on National Forest System lands in Alaska is included in Chapter 10 of the Region 10 Soil and Water Conservation Handbook (FSH 2509.22) (USDA Forest Service, 1991b). The handbook describes the application, monitoring, evaluation, and refinement of these BMPs. Appendix C of the Forest Plan (TLMP, 1997) provides a listing and brief summary of the BMPs used in the Alaska Region. Many other Forest Plan standards and guidelines apply, in addition to those cited in Table 2-3. These standards and guidelines, including Appendix C above, are incorporated by reference (TLMP, 1997).

Table 2-1
Physical and Economic Outputs of Alternatives

Item	Units	Alternative 1	Alternative 10	Alternative 11	Alternative 12	Alternative 13
Timber Harvest						
Harvest Units	Number	0	31	91	112	79
Harvest Units	Acres	0	964	2,980	3,769	2,577
Avg. Unit Size	Acres	0	31.1	32.7	33.7	32.6
Avg. Volume per acre (in units)	MBF	0	27.0	23.8	22.8	23.7
Units with Harvest Openings over 100 acres	Number	0	0	0	0	0
Total Volume (including ROW)	MMBF	0	26	71	86	61
Silvicultural System						
Clearcut with Reserve Trees	Acres	0	325	632	687	622
Non-clearcut Regeneration	Acres	0	631	2,052	2,605	1,614
Uneven-aged Management	Acres	0	8	296	477	341
Logging system						
Conventional	Acres	0	681	1,986	2,583	1,672
Helicopter	Acres	0	283	994	1,186	905
Roads and Facilities						
Road Construction	Miles	0	19	57	77	42
Road Reconstruction	Miles	0	2	5	7	4
Road Construction/Reconstruction	Acres	0	189	558	756	414
New Log Transfer Facilities	Number	0	0	0	0	0
Potential for New Logging Camps	Number	0	0	0	0	0
Economics						
Estimated Net Stumpage (High Market)	$/MBF		$75.83	$50.80	$37.98	$64.33
Present Net Value	$ million		$0.4	-$1.0	-$2.6	-$0.1
Payments to State of Alaska	$ million		$1.4	$3.5	$4.3	$2.9
Average Annual Direct Jobs Over 4 Years	# of jobs	0	39	117	143	100

Table 2-2
Environmental Consequences of Alternatives

Item	Units	Alternative 1	10	11	12	13
Caves and Significant Karst Features						
Harvest Units Potentially Affecting	# of Units	0	0	0	0	0
Soils						
Area of Soil Disturbance						
Harvest Units	Acres	0	69	186	238	160
Roads and Landings	Acres	0	201	582	782	437
Total Area Affected by Mass Movement Index Category						
Very High MMI	Acres	0	0	0	0	0
High MMI	Acres	0	468	1,168	1,394	1,110
Wetlands, Floodplains, & Riparian						
Wetland Area Affected						
Harvest Units	Acres	0	529	1,353	1,779	1,248
Roads	Acres	0	99	276	413	216
Class I Stream Floodplain Road Crossings	Number	0	9	30	41	17
Riparian Management Area Harvested	Acres	0	0	0	0	0
Fish and Water Quality						
Road Crossings						
Class I Streams	Number	0	9	30	41	17
Class II Streams	Number	0	10	25	31	14
Class III/IV Streams	Number	0	43	120	144	95
Wildlife						
Change in MIS Habitat Capability						
Sitka Black-tailed Deer (0-25 yrs. post-harvest)	Percent	0	-0.1	-0.7	-0.9	-0.5
Sitka Black-tailed Deer (25-100 yrs. post-harvest)	Percent	0	-0.4	-1.8	-2.5	-1.3
Marten (0-25 yrs. post-harvest)	Percent	0	-0.5	-1.7	-2.1	-1.4
Marten (25-100 yrs. post-harvest)	Percent	0	-0.6	-2.0	-2.5	-1.6
Harvest in Deer Winter Range						
High Quality Winter Range	Acres	0	18	222	358	95
Subsistence						
Deer Habitat Capability in Project WAAs	Number	8,441	8,423	8,370	8,342	8,388
1995 Harvest as a % of Habitat Capability	Percent	12.9	13.0	13.0	13.1	13.0
Visual and Recreation Resources						
Priority Travel Routes and Use Areas						
West Coast Waterway	# of Units Visible	0	1	8	10	6
Waters Around Craig and Klawock	# of Units Visible	0	1	5	5	5
Control Lake Cabin	# of Units Visible	0	1	2	2	2
Eagle's Nest Campground	# of Units Visible	0	0	2	2	2
Thorne River/Honker Divide Canoe Route	# of Units Visible	0	0	3	3	3
Forest Highway #9/30 Road	# of Units Visible	0	7	11	13	10
ROS Settings						
Change in Area of Unroaded Settings	Acres	0	-7,124	-27,506	-36,119	-23,536
Change in ROS at Existing Recreation Sites	# of sites	0	0	0	0	0
Change in ROS at Potential Recreation Sites	# of sites	0	2	2	2	2
Cultural Resources						
Sites Affected						
Direct Effects	# of sites	0	0	0	0	0
Risk of Indirect Effects	# of sites	0	0	0	0	0

Table 2-3
Site-Specific Mitigation Measures Incorporated into Unit and Road Design[1/]

Mitigation Measure	Description	No. of Units Affected in Each Alternative[2/] 10	11	12	13
Minerals and Caves					
M1	Protect all known mineral improvements, such as mine claim markers, by specifications in timber sale and road construction contracts.	0	0	0	0
M2	Develop and implement site-specific protective measures for cave and karst features containing significant resources.	0	2	2	2
Fish, Water Quality, and Soils					
F1	Modify unit design to avoid very high mass movement areas (BMP 13.5), including slopes >72%.	11	47	58	36
F2	Avoid road construction in areas of very high mass movement potential resulting in the need for helicopter yarding.	7	19	22	17
F3	Require partial- to full-suspension logging systems in areas with high mass movement potential or McGilvery soils (BMP 13.9).	12	43	54	33
F4	Modify unit design or logging system to avoid or minimize damage to muskegs or other wetlands (BMPs 12.5 and 13.15).	18	46	61	43
F5	Establish no-harvest and selective-cut buffers along streams and around lakes to protect Riparian Management Areas (BMP 12.6). This includes TTRA minimums and additional area as described in the Riparian Standards and Guidelines.	30	87	106	75
F6	Avoid roads on slopes >67%, unstable or slide prone areas. If not able to avoid, take special measures to prevent soil erosion or mass wasting.	12	41	52	32
F7	Permit no harvest within steep Class IV V-notch streams with high erosion potential (BMP 12.7 and 13.16).	6	23	27	20
F8	Implement measures to reduce surface erosion and drainage interruption related to transportation including water barring and cross-draining roads, using ditches and culverts to prevent water running long distances over roads, seeding and fertilizing cut and fill slopes, and locating and designing landings for good drainage and dispersion of water (BMPs 13.10 14.3, 14.5, 14.8, 14.9, 14.11, 14.12, 14.13).	24	71	89	61
F9	Protect local water supplies by implementing erosion control measures during road construction.	0	0	0	0
F10	Establish timing restrictions for instream road construction activities to avoid impacts on fish populations (BMP 14.6).	9	30	36	25
F11	Evaluate opportunity for stream barrier removal to increase fish habitat availability.	-	-	-	-
F12	Evaluate opportunity for stream habitat enhancement by addition of large woody debris (LWD).	-	-	-	-

Table 2-3 (continued)

Site-Specific Mitigation Measures Incorporated into Unit and Road Design[1/]

Mitigation Measure	Description	No. of Units Affected in Each Alternative[2/] 10	11	12	13
Vegetation and Timber					
T1	Conduct partial harvest by helicopter to maintain yellow-cedar trees in the unit to provide seed and shelter to maintain high yellowcedar composition in future stand.	0	0	1	
Wildlife					
W1	Provide for greater habitat diversity on a stand level by leaving no-cut islands or fingers of timber (Type D Clearcut).	25	69	84	57
W2	Provide for greater structural diversity on a stand level by partial cutting all or most of the harvest unit.	7	34	48	31
W3	Provide for greater structural diversity on a stand level by leaving nonmerchantable trees and safe snags over the entire harvest unit (Type C Clearcut).	7	19	20	18
W4	Provide for snag retention and greater structural diversity on a stand level by prescribing and contractually requiring a specified number of reserve trees including snags and live tree replacements along the harvest unit edges and internal setting boundaries. Also leave safe-snags and nonmerchantable, reserve trees along harvest unit edges and internal setting boundaries through contractual recommendations (Type B Clearcut).	11	25	28	22
W5	Provide for snag retention and greater structural diversity on a stand level by leaving safe snag and nonmerchantable reserve trees along harvest unit edges and internal setting boundaries through contractual recommendations (Type A Clearcut).	12	34	42	27
W6	Maintain uncut areas of original unit and leave trees throughout the harvest portion of the unit high value marten habitat.	5	8	8	8
W7	Modify unit design to provide 30-acre no-cut buffers around known marbled murrelet nest sites.	-	-	-	-
W8	Restrict the timing of helicopter logging and/or helicopter flight paths and blasting near bald eagle nest sites when occupied.	-	3	3	1
W9	Implement Region 10 goshawk management guidelines, as appropriate, if nesting is identified.	-	4	5	3
W10	Implement road closures immediately after harvest to minimize human disturbance to wildlife and road access by hunters in specific areas.	17	59	78	49
W11	Evaluate potential for disturbance and restrict harvest and road construction activities in areas and during time periods when Vancouver Canada goose nesting or trumpeter swan wintering might be disturbed.	6	16	20	16
W12	Modify unit and road location to provide wolf den buffers. Monitor according to the Forest Plan.	1	3	3	3

Table 2-3 (continued)

Site-Specific Mitigation Measures Incorporated into Unit and Road Design[1/]

Mitigation Measure	Description	No. of Units Affected in Each Alternative[2/] 10	11	12	13
W13	Restrict the approach of Forest Service-authorized aircraft and vessels near humpback and other whales.	-	-	-	-
W14	Restrict harvest and road construction within 1/2 mile of active peregrine falcon nest sites.	-	-	-	-
Visual Resources					
V1	Modify unit boundaries to assure harvest unit meets proposed VQOs in partial retention/retention areas.	4	12	17	11
V2	Conduct partial cutting of unit to minimize visual contrast with adjacent areas.	3	12	16	11
V3	Leave behind all nonmerchantable trees after clear-cutting to minimize visual contrast with adjacent areas.	2	5	5	5
Recreation					
R1	Close roads to keep area as remote as possible to minimize effects on roadless opportunities.	4	39	54	28
R2	Provide for public access, parking, and sufficient turn-outs at recreation sites.	-	-	-	-
R3	Require all road construction slash and debris from right-of-way (ROW) clearing along roads to be used for recreational access, to be buried in the road prism or hauled to a designated disposal area.	-	-	-	-
Cultural Resources					
C1	Provide for mitigation of indirect effects to cultural resource sites near proposed harvest units and roads.	0	4	4	4

\- These measures potentially affect an indefinite number of harvest units.

1/ Refer to the appropriate section in Chapter 4 for a more complete description of each measure.

2/ Refer to Appendix C for a specific listing of the units affected.

Monitoring

Monitoring activities can be divided into three broad categories: Forest Plan monitoring, routine implementation monitoring, and project-specific monitoring. These broad types are discussed in the following sections.

Forest Plan

The National Forest Management Act requires that National Forests monitor and evaluate their forest plans (36 CFR 219.11). The significance of this requirement is emphasized by the recent development of a National Monitoring and Evaluation Strategy (USDA Forest Service, 1993a). The Strategy is designed to focus agency attention and resources on evaluating implementation of forest plans to provide the Forest Service with information necessary to ensure responsive and efficient management of National Forests. Embodied in the National Monitoring and Evaluation Strategy are three principles: (1) evaluation of results will be readily available to the public, agencies, and other groups; (2) monitoring and evaluation will focus on ecosystems and emphasize interrelationships among biotic and abiotic components; and (3) the strategy will be flexible to meet local needs while encompassing forest, regional, and national requirements. Three levels of monitoring are incorporated into Forest Plan monitoring and evaluation:

- **Implementation Monitoring** is used to determine if goals, objectives, standards and guidelines, and management prescriptions are implemented as detailed in the Forest Plan and project specifications.
- **Effectiveness Monitoring** is used to determine if standards and guidelines and management prescriptions as designed and implemented are effective in meeting Forest Plan goals and objectives.
- **Validation Monitoring** is used to determine whether the data, assumptions, and coefficients used in the development of the Plan are correct.

Most monitoring elements involve the mitigation measures described previously. The mitigation measures are part of a process that includes these three types of monitoring to determine if the measure was implemented and is effective or needs revision. The feedback provided by monitoring results can be used to develop improved methods or additional treatments to ensure that the mitigation will be effective in the future. Figure 2-6 displays how this process of mitigation and monitoring occurs.

An annual monitoring report is prepared by the Tongass and incorporated into a report at the end of each year.

These reports address all monitoring questions contained in the applicable Forest Plan, reference all monitoring being conducted on the area/forest, assess progress towards achieving the goals and objectives described in the Forest Plan, and either certify that the Forest Plan is sufficient to guide management of the forest over the next year or propose needed changes and an approach for dealing with those changes.

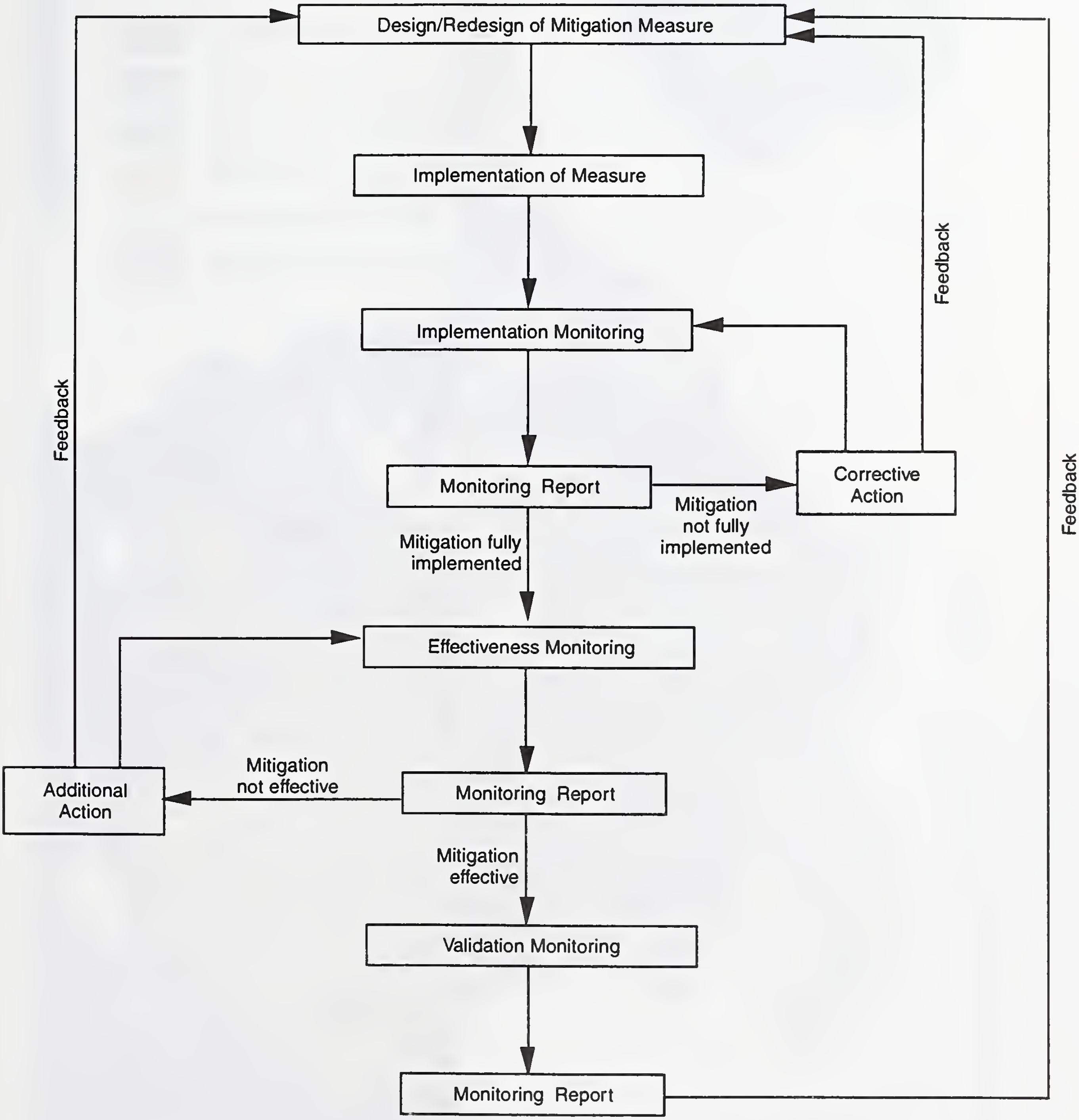
Forest Plan monitoring is conducted over the entire forest on a sample basis. Samples will be taken within the Control Lake Project Area. These results can be used to help answer questions regarding the implementation and effectiveness of mitigation within the Project Area. A number of implementation, effectiveness, and validation monitoring items are identified for each resource area in the forest-wide monitoring plan described in the TLMP Revision (1997).

Routine Implementation Monitoring

Routine implementation monitoring assesses whether the project was implemented as designed and whether or not it complies with the Forest Plan. Planning for routine implementation monitoring began with the preliminary design of harvest units and roads. Specialists used on-the-ground inventories, computer inventories, and aerial photographs to prepare documents called unit cards for each harvest unit in each of the alternatives. Cards were also prepared for each segment of road. Resource specialists wrote their concerns on the cards and then described how the concerns could be addressed in the design of each unit and road segment. Integrated silvicultural prescriptions were prepared to describe the detailed interdisciplinary prescription for each unit. Resource concerns, mitigation measures, and prescriptions will be refined further during final layout when specialists will have one more opportunity to revise the unit and road card recommendations and integrated silvicultural prescriptions. The unit and road cards and prescriptions will be the basis for determining whether recommendations were implemented for various aspects of the Control Lake Project.

Routine implementation monitoring is part of the administration of a timber sale contract. The sale administrators and road inspectors ensure that the recommendations contained on the unit and road cards and the prescriptions are incorporated into contract documents and then monitor performance relative to contract requirements. All units and roads in the timber sale are included in the monitoring.

Figure 2-1
Mitigation/Monitoring Feedback Loop



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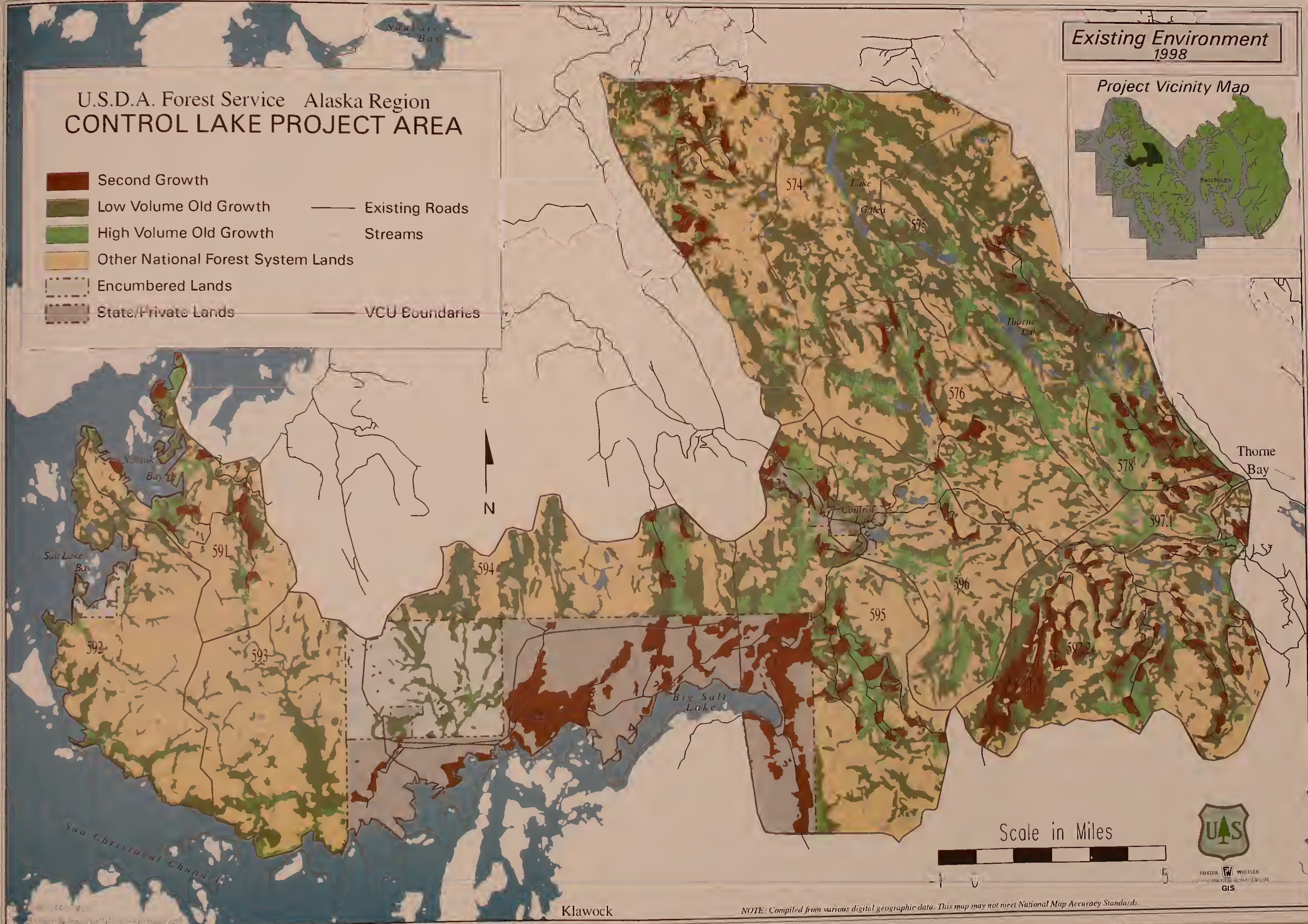

U.S.D.A. Forest Service Alaska Region
CONTROL LAKE PROJECT AREA
Second Growth
Low Volume Old Growth
High Volume Old Growth
Other National Forest System Lands
Encumbered Lands
State/Private Lands
Existing Roads
Streams
VCU Boundaries
Existing Environment
1998
Project Vicinity Map
Ketchikan
574
575
576
578
591
592
593
594
595
596
597.1
597.2
Lake Galea
Thorne Lake
Control Lake
Big Salt Lake
Naukati Bay
Nossuk Bay
Salt Lake Bay
San Christoval Channel
Thorne Bay
Klawock
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Scale in Miles
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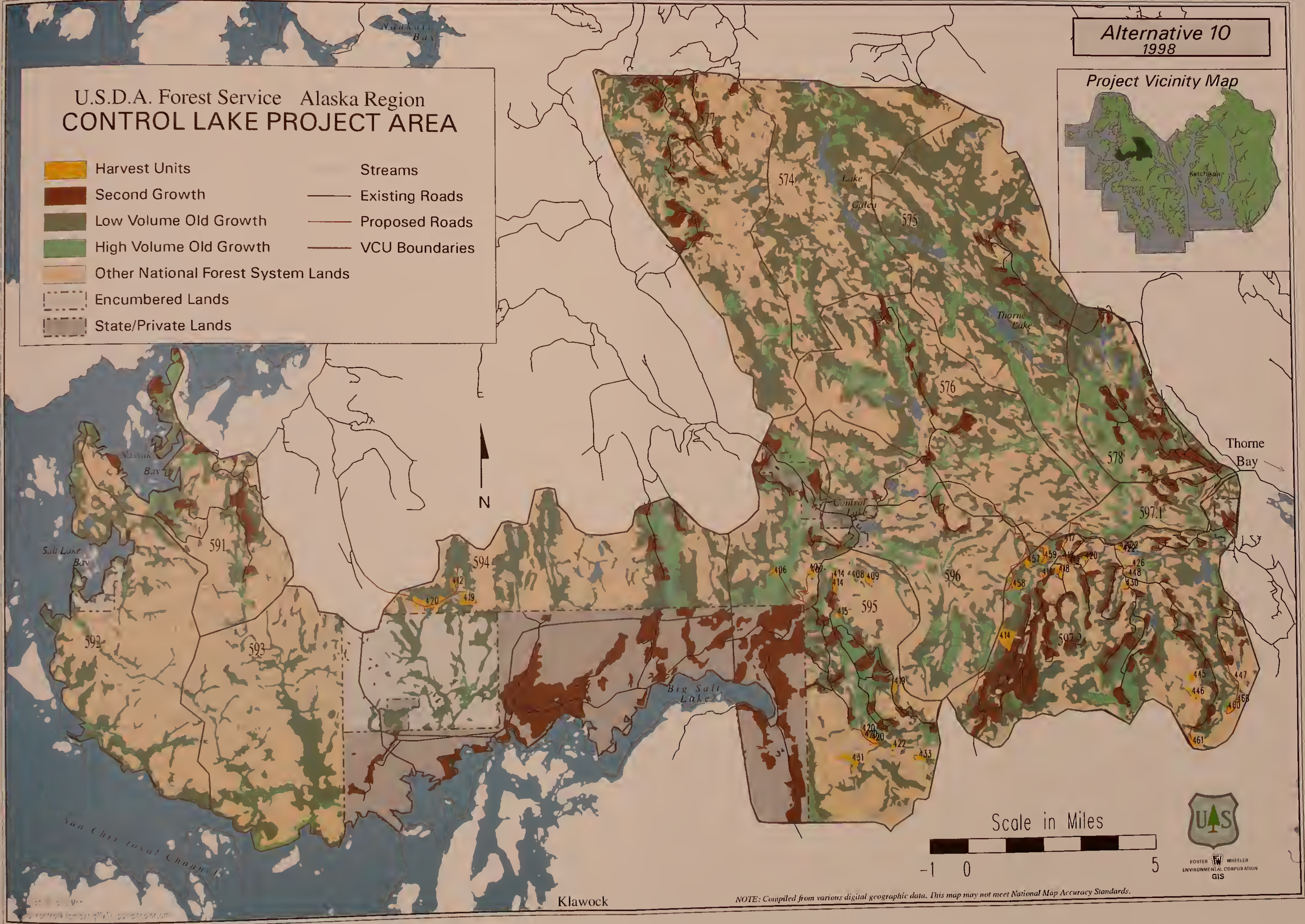
5
GIS
NOTE: Compiled from various digital geographic data. This map may not meet National Map Accuracy Standards.


Alternative 10
1998
U.S.D.A. Forest Service Alaska Region
CONTROL LAKE PROJECT AREA
Harvest Units
Second Growth
Low Volume Old Growth
High Volume Old Growth
Other National Forest System Lands
Encumbered Lands
State/Private Lands
Streams
Existing Roads
Proposed Roads
VCU Boundaries
Project Vicinity Map
Ketchikan
Naukati Bay
Nossuk Bay
Salt Lake Bay
Lake Galea
Thorne Lake
Control Lake
Big Salt Lake
Thorne Bay
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Scale in Miles
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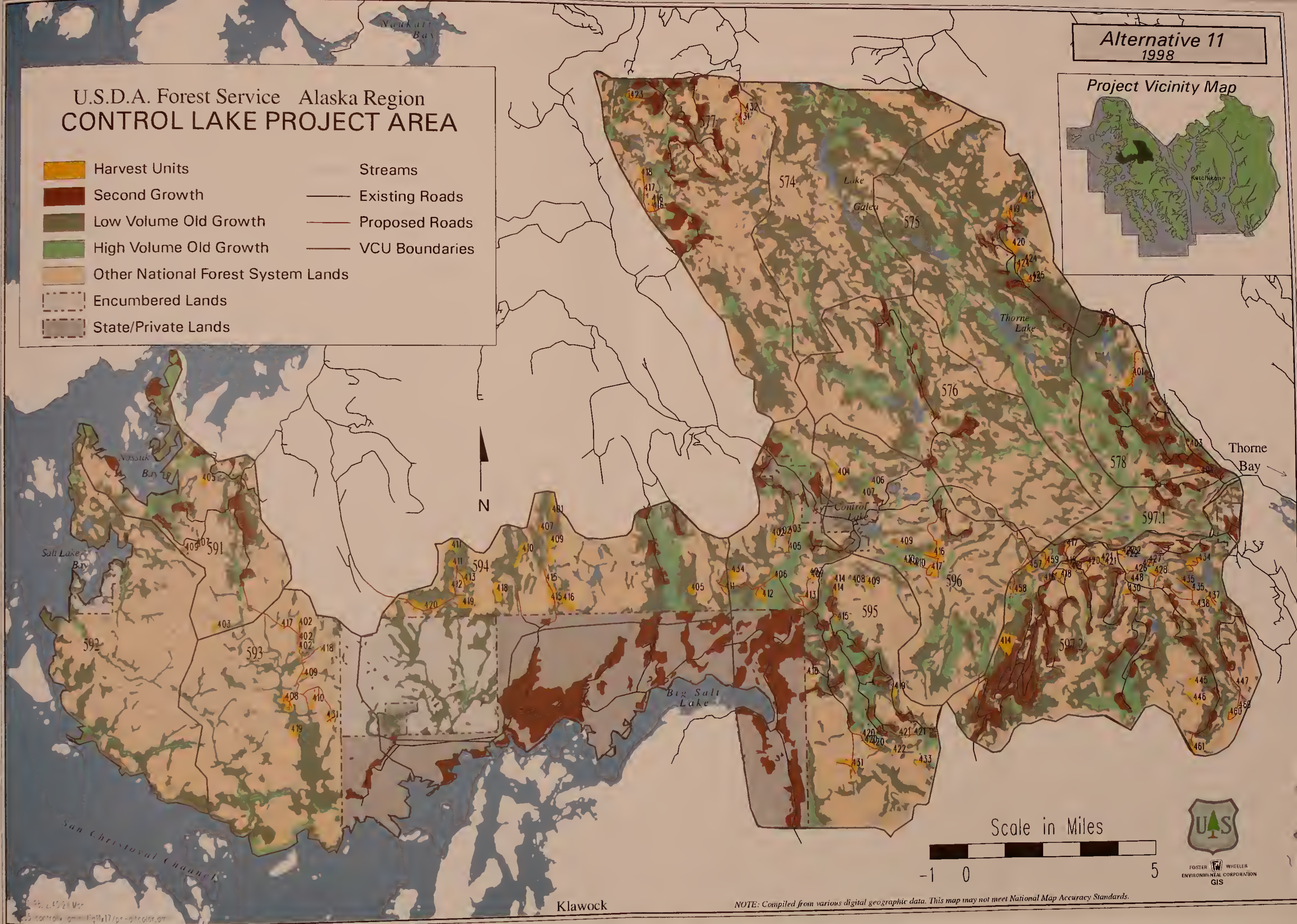
NOTE: Compiled from various digital geographic data. This map may not meet National Map Accuracy Standards.
FOSTER WHEELER ENVIRONMENTAL CORPORATION GIS



Alternative 11
1998
Project Vicinity Map
Ketchikan
U.S.D.A. Forest Service Alaska Region
CONTROL LAKE PROJECT AREA
Harvest Units
Second Growth
Low Volume Old Growth
High Volume Old Growth
Other National Forest System Lands
Encumbered Lands
State/Private Lands
Streams
Existing Roads
Proposed Roads
VCU Boundaries
N
Lake Galea
Thorne Lake
Thorne Bay
Control Lake
Big Salt Lake
Salt Lake Bay
Naukati Bay
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Scale in Miles
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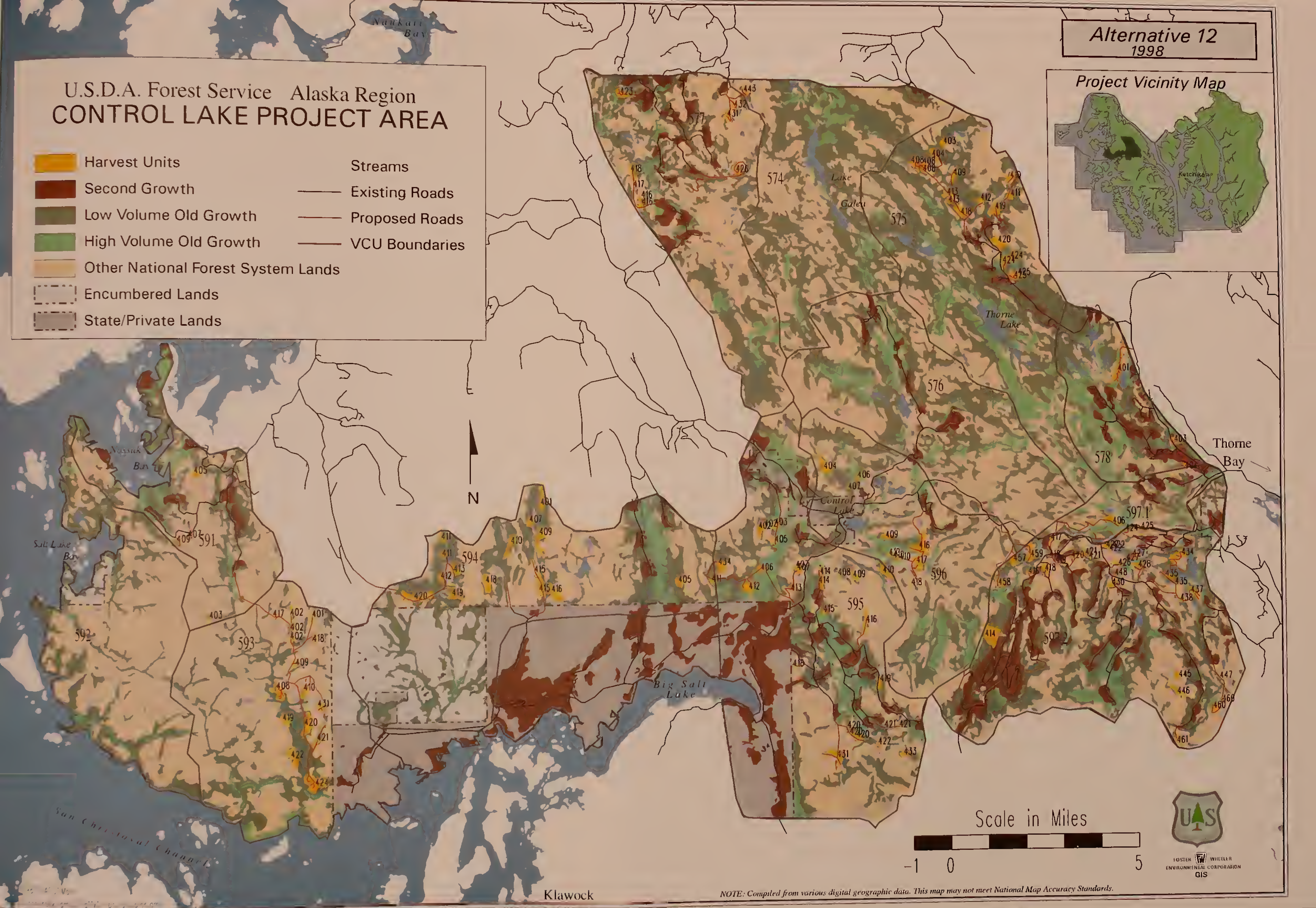
FOSTER WHEELER ENVIRONMENTAL CORPORATION GIS
NOTE: Compiled from various digital geographic data. This map may not meet National Map Accuracy Standards.



U.S.D.A. Forest Service Alaska Region
CONTROL LAKE PROJECT AREA
Harvest Units
Second Growth
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High Volume Old Growth
Other National Forest System Lands
Encumbered Lands
State/Private Lands
Streams
Existing Roads
Proposed Roads
VCU Boundaries
Alternative 12
1998
Project Vicinity Map
Ketchikan
Naukati Bay
Lake Galea
Thorne Lake
Control Lake
Thorne Bay
Big Salt Lake
Salt Lake Bay
Nossuk Bay
San Christoval Channel
Klawock
574
575
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594
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596
597.1
597.2
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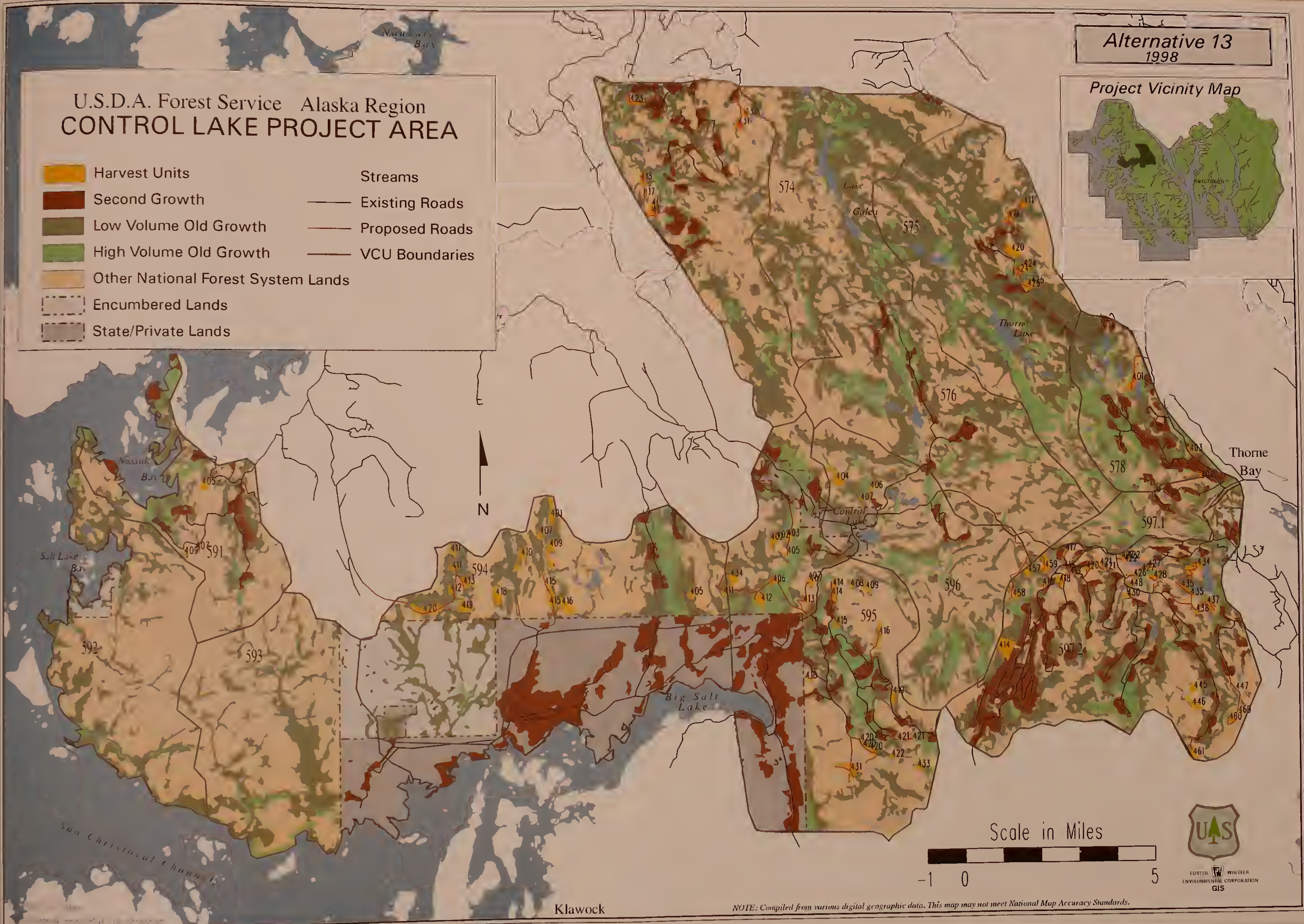
Scale in Miles
-1 0 5
FOSTER WHEELER ENVIRONMENTAL CORPORATION GIS
NOTE: Compiled from various digital geographic data. This map may not meet National Map Accuracy Standards.



Alternative 13
1998
Project Vicinity Map
Ketchikan
U.S.D.A. Forest Service Alaska Region
CONTROL LAKE PROJECT AREA
Harvest Units
Second Growth
Low Volume Old Growth
High Volume Old Growth
Other National Forest System Lands
Encumbered Lands
State/Private Lands
Streams
Existing Roads
Proposed Roads
VCU Boundaries
N
574
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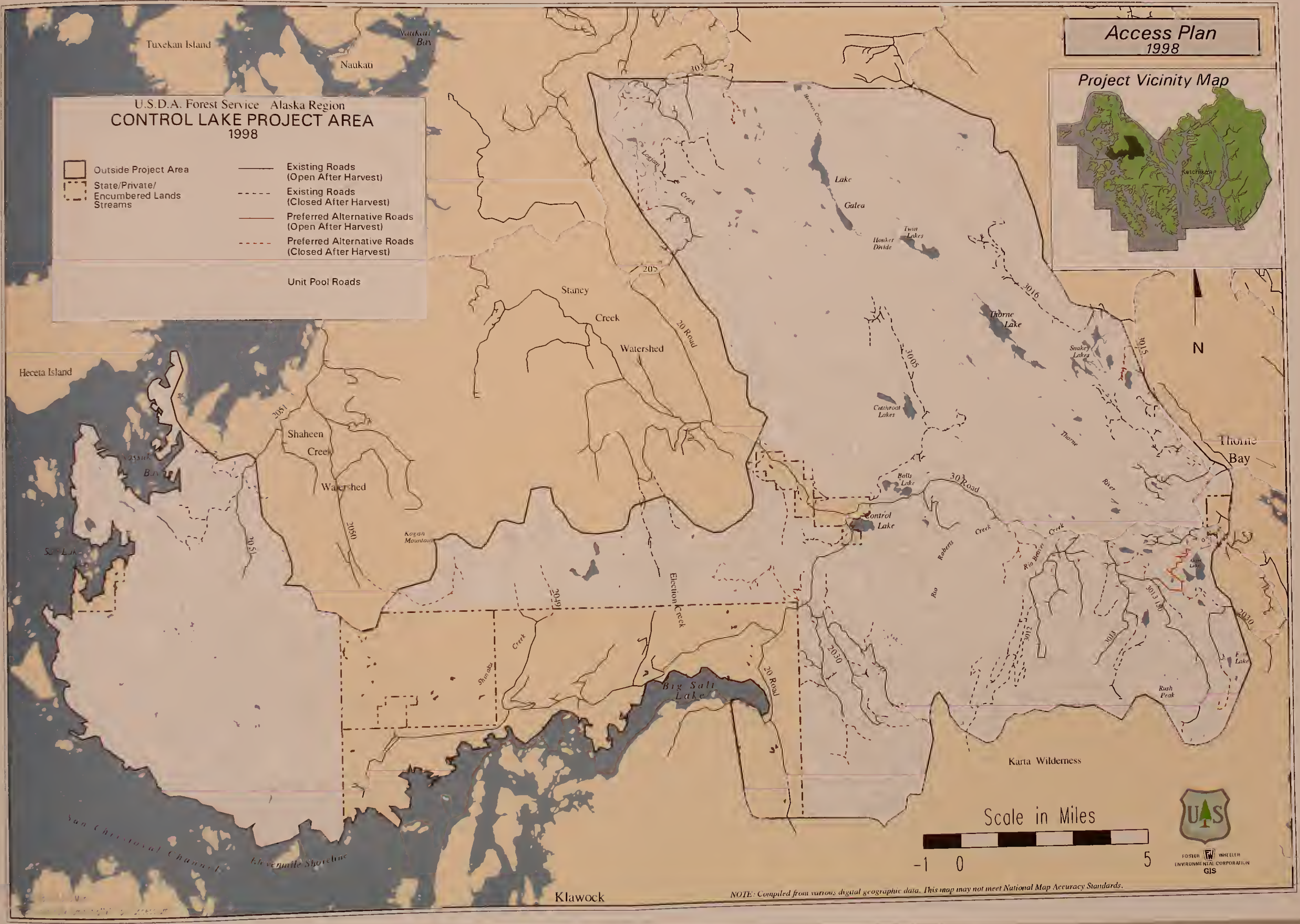
Lake Galea
Thorne Lake
Control Lake
Big Salt Lake
Thorne Bay
Klawock
San Christoval Channel
Scale in Miles
-1 0 5
FOSTER WHEELER ENVIRONMENTAL CORPORATION GIS
NOTE: Compiled from various digital geographic data. This map may not meet National Map Accuracy Standards.


Access Plan
1998
Project Vicinity Map
Ketchikan
U.S.D.A. Forest Service Alaska Region
CONTROL LAKE PROJECT AREA
1998
Outside Project Area
State/Private/
Encumbered Lands
Streams
Existing Roads
(Open After Harvest)
Existing Roads
(Closed After Harvest)
Preferred Alternative Roads
(Open After Harvest)
Preferred Alternative Roads
(Closed After Harvest)
Unit Pool Roads
Tuxekan Island
Naukati
Heceta Island
Staney
Creek
Watershed
Shaheen
Creek
Watershed
Lake
Galea
Honker
Divide
Twin
Lakes
Thorne
Lake
Snake
Lakes
Cutthroat
Lakes
Thorne
Bay
Control
Lake
Election Creek
Big Salt
Lake
20 Road
30 Road
Karta Wilderness
Rush
Peak
Klawock
Scale in Miles
-1 0 5
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NOTE: Compiled from various digital geographic data. This map may not meet National Map Accuracy Standards.
FOSTER WHEELER
ENVIRONMENTAL CORPORATION
GIS

Chapter 3

Affected Environment

Chapter 3

Affected Environment

Introduction

This chapter provides information concerning the existing environment of the Control Lake Project Area that might be affected by implementation of the action alternatives. It describes the baseline conditions against which environmental effects can be evaluated and from which progress toward the desired future condition of the resource, trends related to its status, and relevant characteristics that might be affected by the alternatives. The following resources are discussed:

- Climate and Air Quality
- Geology, Minerals, and Karst
- Soils
- Wetlands, Floodplains, and Riparian Areas
- Water, Fish, and Fisheries
- Vegetation and Timber Resources
- Wildlife
- Threatened, Endangered, and Sensitive Species
- Biodiversity
- Lands
- Transportation and Facilities
- Economic and Social Environment
- Subsistence
- Cultural Resources
- Visual Resources
- Recreation, Roadless Areas, Wild and Scenic Rivers, and Wilderness Area

Chapter 4 discusses the effects of the proposed alternatives on the above resources and in this same sequence.

Available Information

There is less than complete knowledge about many of the relationships and conditions of wildlife, fish, forests, jobs, and communities. The ecology, inventory, and management of a large forest area is a complex and developing science. The biology of wildlife species prompts questions about population dynamics and habitat relationships. The interaction of resource supply, the economy, and communities is the subject matter of an inexact science.

3 Affected Environment

In developing Chapters 3 and 4 of this EIS, the interdisciplinary team (ID Team) examined the data and relationships used to estimate the effects of the alternatives. The data and level of analysis used were commensurate with the importance of the possible impacts (40 CFR 1502.15); and relevant discussion in the Revised TLMP (1997) are incorporated by reference (40 CFR 1502.21).

When encountering a gap in information, the ID Team concluded that the missing information frequently would have added precision to estimates or better specified a relationship. However, the basic data and central relationships are sufficiently well established in the respective sciences that the new information would be very unlikely to reverse or nullify understood relationships. Thus, new information would be welcomed and would add precision, but it was not essential to provide adequate information for each alternative such that the decision-maker can make a reasoned choice.

Land Divisions

The area of the Tongass National Forest has been divided in several ways to describe the different resources and allow analysis of how they might be affected by Forest Plan and project-level decisions. These divisions vary by resource since the relationship of each resource to geographic conditions and zones also varies. Three land divisions that are used for more than one resource are described in the following sections.

Geographic Provinces

These are seven large land areas that are distinguished by differences in ecological processes. They are defined by a combination of climatic and geographic features and vegetation. Geographic provinces are used in the *Biodiversity* and *Wildlife* sections.

Value Comparison Units

VCUs are distinct geographic areas, each encompassing a drainage basin containing one or more large stream systems. The boundaries usually follow watershed divides. The Tongass contains 867 VCUs. Thirteen VCUs are found in the Control Lake Project Area (VCUs 574 through 578, 591 through 596, 597.1, and 597.2) (see Figure 1-5). These VCUs are used to describe the locations of specific resources in the Project Area.

Wildlife Analysis Areas

Wildlife Analysis Areas (WAAs) are Forest Service land divisions that correspond to Minor Harvest Areas used by the Alaska Department of Fish and Game (ADF&G). Approximately 190 apply to the Tongass and all or part of four WAAs (1318, 1319, 1323, and 1421) to the Control Lake Project Area. They are used in the *Subsistence*; *Water, Fish, and Fisheries*; and *Wildlife* sections.

Geographic Information System

Tongass National Forest resource data resides in an electronic database formatted for a GIS. The Forest Service uses GIS software to assist in the analysis of these data. Much of the data consists of electronic "map layers," each representing a particular resource or attribute (i.e., vegetation types, soil types, recreation places). Specific information gathered for the Control Lake Project Area was added to the Forest Service information already contained in the system to generate spatial analyses of alternatives and effects. GIS plots displaying resource data in map format and tables based on electronically measured areas and lengths are found throughout this EIS.

General Project Area Description

The Control Lake Project Area encompasses a large part of the central portion of Prince of Wales Island (see Figure 1-1). The area includes diverse terrain from inlets, bays, and beach fringes to alpine slopes and ridges. A variety of land forms and vegetative communities exists between the two elevational extremes. Over 90 percent of the Project Area land is forested with slightly more than half considered commercial forest land. A majority of the commercial forest land is classified as old growth. The most prolific conifer species found in the area are western hemlock and Sitka spruce. The Thorne River drainage is a major component of the landscape in the eastern portion of the Project Area. Muskegs and lakes, both large and small, are found across the Project Area.

The forests, shorelines, streams, and rivers of Southeast Alaska provide habitat for over 300 species of birds and mammals. Management Indicator Species (MIS) in the Project Area include the Sitka black-tailed deer, black bear, river otter, marten, gray wolf, Vancouver Canada goose, bald eagle, red-breasted sapsucker, hairy woodpecker, and brown creeper. Anadromous and resident fish occupying Project Area streams are important to sport, commercial, and subsistence users throughout Southeast Alaska. Coho and pink salmon are the MIS that represent anadromous fish, and Dolly Varden char represents resident fish for the Control Lake Project Area.

The largest communities near the Project Area are Klawock and Thorne Bay. The small communities of Coffman Cove and Naukati are also near the Project Area. The Island road system connects these communities with Hollis (south of the Project Area), which is the only Alaska Marine Highway ferry terminal on Prince of Wales Island.

3 Affected Environment

Climate and Air Quality

Key Terms

Ambient air—that air, external to building, encompassing or surrounding a specific region.
Ambient air quality standard—the prescribed level of pollutants in the outside air that cannot be exceeded legally during a specified time in a specified geographical area.
Class I airshed—one of three classes of areas provided for in the Clean Air Act for the Prevention of Significant Deterioration program. Class I airsheds are the "cleanest" and receive special visibility protection.
Class II airshed—the second of three classes of areas provided for in the Clean Air Act. Class II airsheds have no specific attainment criteria.

Climate

The maritime influences of the Pacific Ocean create a moderate climate in Southeast Alaska. The result is a cooling influence in the summer and warmer winter temperatures than would be expected for these latitudes. Normal temperatures range from about 40°Fahrenheit (°F) to 65°F in summer, and from the high teens to about 40°F in the winter. During the warmer months, temperatures are highest inland and lowest along the coast, while the reverse is true in the colder months. The majority of climate stations in Southeast Alaska are near sea level and may not reflect conditions at higher elevations.

The north Pacific Ocean also generates low pressure weather systems that move onshore and produce abundant cloud cover. These low pressure systems also generate gale-force winds (greater than 32 mph). Gale-force winds occur year-round with the vast majority occurring in the fall and winter. Table 3-1 shows the number of days between 1953 and 1978 that strong winds occurred in the area. Over 80 percent of the gale-force winds reported in this period were from the south or southeast.

The Project Area has complete cloud cover about 85 percent of the year. These clouds inundate the area with precipitation. Precipitation gages are located near sea level in Craig and Hollis. Records are short, reliable averages are not available, and gaps occur in some records. Information on meteorological processes occurring inland and at higher elevations does not exist. Figure 3-1 shows average monthly precipitation in 1991 and 1992 for Craig and Hollis. The station values show that Craig and Hollis receive the most precipitation in fall and winter, and receive the least precipitation in June and July. High precipitation persists through the middle of November when intermittent snowfall occurs. Snowfall varies according to elevation and distance inland from the coast. Snow accumulation below 500-feet elevation is short-lived, generally melting off within a few days because of warmer temperatures and rain.

Table 3-2 shows mean annual summer and winter temperatures, precipitation, and snowfall for the portion of Prince of Wales Island that includes the Control Lake Project Area.

Air Quality

Because of the relatively pristine nature of Southeast Alaska, there is a general lack of ambient air monitoring data to characterize undeveloped areas. Some ambient monitoring occurs near a few of the large potential air pollution sources, such as pulp mills; however, those data are not representative of the area as a whole. The air flow from the Gulf of Alaska is not tainted by industrial air pollution and, in the absence of specific data to the contrary, can be expected to meet all standards for protection of public health and welfare. Local sources of airborne particulates include motor vehicle emissions, motor vessels and cruise

Table 3-1

Number of Days, by Month, with Winds Over 30 Miles Per Hour[1/]

Month	Miles per Hour 31-35	36-40	41-45	46-50	51-55	56-60	Total Days
July	3						3
August	5	4					9
September	11	7	3		1		22
October	67	45	13	4	3		132
November	58	41	5	8	1		113
December	64	39	9	9	2	3	126
January	70	29	5	6	2	2	114
February	60	31	2	8			101
March	25	9	8	4			46
April	32	9	7	2			50
May	8	5	2				15
June	11	1	1				13

SOURCE: Harris, 1989.

1/ Daily fastest mile wind speed is obtained by measuring and averaging instantaneous wind velocities over 1 minute once each hour. The highest of all the 24 hourly measurements for the day is called the fastest mile and is included in published reports. National Oceanographic and Atmospheric Administration (NOAA) Meteorological Station at Annette Island, Alaska, 1953-78.

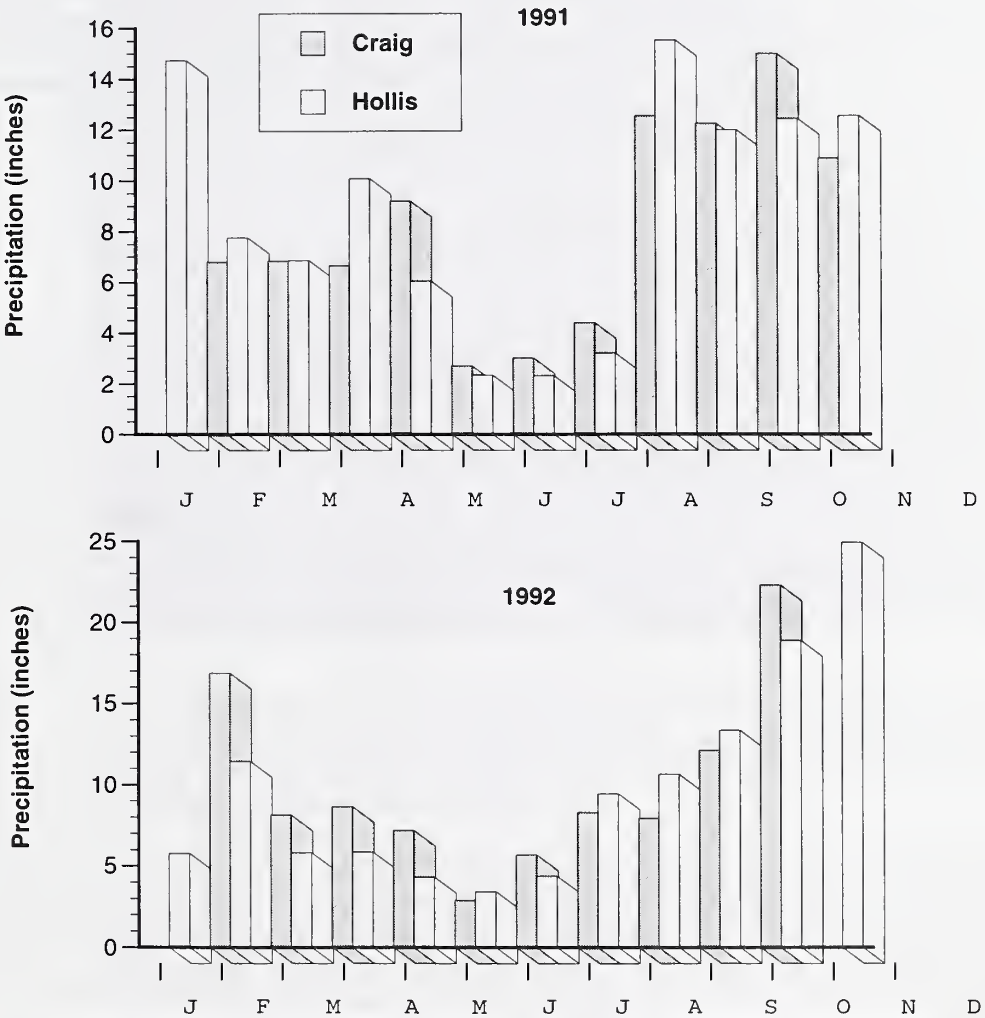
Table 3-2

Mean Yearly Summer and Winter Temperatures, Precipitation, and Snow Accumulation for Craig and Hollis

Recording Station	Mean Summer Temperature (°F)	Mean Winter Temperature (°F)	Mean Precipitation (inches)	Mean Snow (inches)
Craig	55.0	34.8	106.47	35.7
Hollis	56.6	33.7	109.69	14.0

SOURCE: Alaska Climate Center Technical Note No. 3, 1986.

Figure 3-1
Average Monthly Precipitation in Craig and Hollis, 1991 and 1992.



ships, dust, residential and commercial heating sources, marine traffic, a limited amount of prescribed burning, and burning of wood debris at sawmills. The KPC pulp mill at Ward Cove near Ketchikan was closed in early 1997 and is no longer a source of air emissions.

Vehicles and home heating, particularly wood-fired heating, contribute to regional particulate matter concentrations. Alaska has had localized problems with wood smoke, and has issued regulations that limit open burning and other air pollution-generating activities between November 1 and March 31 in wood smoke control areas. The wood smoke control areas do not include the Control Lake Project Area. Open burning may be restricted in the Project Area when an air quality advisory is issued by the Alaska Department of Environmental Conservation (ADEC) (AAC 50.030). The ADEC has the primary responsibility for attaining and maintaining State and Federal ambient air quality standards in the Project Area. The Forest Service cooperates with ADEC to protect air quality in National Forests. The entire area is a designated Class II airshed for purposes of Prevention of Significant Deterioration. This designation allows moderate industrial air pollution concentration increases, compared to the more restrictive requirements of Class I airsheds.

Geology, Minerals, and Karst

Key Terms

Carbonate rock—rocks such as limestone and dolomite which contain a high content of calcium carbonate ($CaCO_3$).
Cave—any naturally occurring void, cavity, recess, or system of interconnected passages that occurs beneath the surface of the earth or within a cliff or ledge and which is large enough to permit an individual to enter.
Cave resources—any material or substance occurring in caves on Federal lands, such as animal life, plant life, paleontological resources, cultural resources, sediments, minerals, speleogens, and speleothems.
Glacial till—gravel, boulders, sand, and finer materials transported and deposited by a glacier.
Graywacke—fine-grained, sedimentary rock made up of quartz, feldspar, and dark mineral grains.
Igneous rock—formed by the cooling and consolidation of magma (lava).
Karst—a type of topography that develops in areas underlain by soluble rocks, primarily limestones.
Lithology—the science dealing with the mineral composition and structure of rocks.
Metamorphic rock—rock whose original compounds, textures, or both have been transformed to new compounds or textures as a result of high pressure, temperature, or both.
Phyllite—a slaty rock with lustrous surfaces due to the high content of mica flakes.
Pleistocene—the epoch forming the first part of the Quaternary period, originating about one to two million years ago, and ending about 10,000 years ago.
Sedimentary rock—formed by chemical precipitation or sedimentation of mineral grains deposited by water, wind, or ice.
Sinkhole—relatively shallow, bowl- or funnel-shaped depressions ranging in diameter from a few feet to more than 3,000 feet.

Introduction

This chapter provides a view of the regional geologic features and parameters that influence the minerals and karst resources of the Control Lake Project Area. Key elements of these geologic features are the lithology and structures that controls the mineral deposition and the karst forms in the limestone of the region.

Geology

The geology of the Control Lake Project Area is controlled by the faulted middle Paleozoic and Cretaceous rock of the Alexander Belt sequence. The predominant rock units are the Devonian-age, variably metamorphosed, volcanics and graywacke of the Descon Formation and the related formations—Staney Creek and Luck Creek. There are two igneous intrusions of Cretaceous-age diorite or quartz diorite within the area. Discontinuous pods of limestone, possibly aligned in a contemporaneous horizon, have been mapped within and slightly above the base of the Staney Creek Formation.

Faulting has resulted in deep northwest trending lineaments which generally parallel the main valleys within the Project Area. In most cases the valley floors contain exposures of phyllite or argillite while the ridge lines have exposed greenstone or andesite. Most of the faults extend for several miles across the Project Area.

Geomorphology

The Control Lake Project Area exhibits two distinct geomorphic sub-provinces. The western and northern part of the area contains moderate to rugged ridge and canyon terrain while glaciation of the central eastern part of the area has evolved a large open valley containing numerous drumlins. Drumlin alignment indicates glacial flow from the west, Control Lake, and from the north, Thorne Lake, directed towards the southeast, Thorne Bay and Salt Chuck. Aerial photo mosaic maps display these coalescing drumlins in a spectacular manner.

These geomorphic provinces have been affected by the Cretaceous intrusion of massive diorite bodies in the northeast and south portions of the area. These intrusions have interrupted the northwest trending valley and ridge system and possibly influenced the convergence and southeast flow of the glaciers.

Two other areas that may contain buried intrusions have been identified. One is north of Control and Cutthroat Lakes and the second is the Kogish Mountain upland. These uplands alter the valley and ridge terrain in a manner similar to the observed intrusions, but no igneous rock was observed in these areas.

The steep canyon walls exhibited relatively few unstable slopes. Rockfalls were present from slopes inclined near-vertical to about 70 degrees. Landslides were found where remnants of glacial till remain on the canyon slopes. These failures occurred on slopes inclined as low as approximately 45 degrees. Lower slopes display minor ravelling as a result of over-steepening caused by stream bank erosion.

Stream courses appeared to be relatively free of sedimentation. In many places the streams flow over water-scoured rock sills, which infer possible regional (or even localized) uplift since glaciation. Localized features which appear to be raised beaches or captured streams also infer regional uplift. These are found mainly along the west coast of Prince of Wales Island. Most streams flow into the estuaries and embayments such as Big Salt Lake, Salt Chuck, Thorne Bay, or Salt Lake Bay.

Stratigraphy

The stratigraphy of the Project Area is dominated by the Silurian-age Descon Formation which contains graywacke and shale that has been metamorphosed in varying degrees to greenstone and phyllite. The older Silurian-age Luck Creek Formation is exposed in the northeastern part of the region, and the younger Devonian-age Staney Creek Formation is located in the northwestern part of the area. Outcrops of the Silurian-age Hecata Limestone were not found in the Project Area.

The age relationships of the three formations is not clear. All three formations may have been deposited at the same time but influenced by slightly different source areas. The Descon Formation appears to be the older unit in the southwestern part of the region while the Luck Creek Formation may be slightly older but definitely appears to interfinger the Descon near the central part of the Project Area. The Staney Creek area contains similar lithology and may also interfinger the Descon and Luck Creek Formations; however, it also contains pods of limestone which, while not as pure as the Hecata on Hecata Island and Prince of Wales Island to the north, contains similar fossils and probably a similar age relationship.

Lithology

The rock types contained within these formations consist of clastic sediments-sandstone and shale, nonclastic limestone deposited in isolated pods, and varying degrees of metamorphosed components of these rocks, such as greenstone and phyllite. Andesite flows were mapped as well as intrusions of andesite and diorite with their metamorphosed equivalents. Metamorphism appears to become more intense with proximity to the Cretaceous intrusions. Other rock types such as basalt, glacial till, conglomerate and red volcanic sandstone were observed scattered through the area.

Eberlein et al. (1983) indicate that the formations appear to change in lithology to the east from a calcareous marine environment to a volcanic, volcanoclastic rock type. Study of this area reinforces this indication. In addition, the formations tend to become more intensely metamorphosed towards the southeast. This may be more of a local influence from the presence of the igneous intrusions.

Structure

The region is dominated by the northwest trending faults described by Eberlein (1984). This faulting probably developed as tectonic forces drove these islands into the North American Plate at an oblique angle resulting in profound shearing stress. The mapping indicated the possibility that a normal or reverse component may also be present on these faults and the near-parallel ridges and valley structure may be the result of tilting and uplift of the sheared island plate. It also appears that some of the faults are truncated by the Cretaceous-age igneous intrusions.

Minerals

Mineralization has occurred in economic concentrations southeast of the Control Lake Project Area. The Salt Chuck and Brown and Rush Mines were active operations until the 1940s. Prince of Wales Island produced copper, gold, silver, and marble in economic quantities with the bulk of production occurring between 1912 and 1923.

There are no mines located within the Project Area. A total of seven prospects and occurrences were identified within the Project Area boundaries during the field efforts. One prospect located north of Black Bear Lake was being evaluated by the owner during summer 1993. The other six occurrences exhibited mineral shows of varying degree. The U.S. Bureau of Mines indicated that there are no current claims staked within the Project Area.

The minerals observed within the Project Area are consistent as to apparent origin, mode of deposition and concentration. The deposits are injections of chalcopyrite, pyrite, bornite, and possibly sphalerite. The deposits consist of fracture filling materials that, except at Black Bear Lake are no more than coatings on the fractures. At Black Bear Lake, a well-developed skarn has developed around the diorite intrusion. Within this skarn zone large clots of injected pyrite and chalcopyrite are visible.

The occurrences observed during the 1993 field season likely do not represent viable economic mineral deposits. Because much of the hard rock, andesite, greenstone, and quartzite contain high percentages of pyrite, this material is not suitable for use as concrete aggregate. In addition, the level of metamorphism found in the region indicates that hydrocarbon deposits are not likely. Limestone outcrops are generally small and isolated. Many in the northern part of the Project Area contain sand or clay which makes the rock soft, friable, and not of economical value.

Currently, the phyllite and quartzite are being used as road ballast and boulders are used as jettystone. This rock appears to degrade with use and probably has a limited useful life. No aggregate sources for general commercial use have been located within the Project Area.

Karst

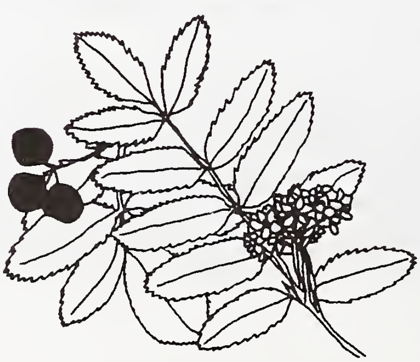
Carbonate rock (limestone) located within the Control Lake Project Area is represented by less than 7,000 acres of bedrock outcrop. Carbonate rock, such as limestone and marble, dissolves in naturally occurring acidic waters. Acidic runoff flowing downslope across limestone exposures will dissolve epikarstic (i.e., surface) features such as rills, runnels, and grikes. Where faulting or jointing provides for deeper penetration, these surface solutions may dissolve out vertical conduits which, when enlarged, form sinkholes. Lateral underground movement of acidic waters can develop extensive cave systems that provide protected environments for both flora and fauna.

Extensive field studies have been performed by the Forest Service (Baichtal, 1991) that highlight the extensive complement of living species and other features that can be found in the cave systems of the region. The 1993 field study did not evaluate any caves for fauna.

In the Project Area, the limestone outcrops occur as individual and isolated pods rather than as continuous and extensive bands of limestone. It is likely that this isolated distribution also characterizes the limestone at depth. Consequently, the distribution of karst features at depth is most likely to be similarly isolated rather than extensive. Most outcrops are karstic with a well-developed epikarst as well as several caves.

The karstic limestone pods appear to be within the Staney Creek Formation and are located slightly above the base of that formation. These discontinuous limestone pods were probably deposited during the same time span. As the outcrop zone trends east and north, the quality of the limestone changes from a massive nonfossiliferous limestone to a granular texture with well preserved fossils. The outcrop band curves westward and leaves the Project Area about 5 miles south of the north Project Area boundary. Outside of the north Project Area boundary several outcrops of black, fossiliferous limestone were observed.

The project field work resulted in the discovery of karst and caves in several of the units originally proposed for harvest. Site investigations were not conducted to determine the extent of the deposits or of the caves within the deposits. The presence of resurgences mostly on the downslope contact of the limestone outcrop infers a limited downdip lateral extent of the outcrops with the likelihood of limited karst development underground.



Soils

Key Terms

Alluvium—stream-deposited sediment.
Colluvium—a deposit of sediment on a hillslope derived from mass movement (landslide processes).
Duff—vegetative material covering the mineral soils in forests, including the fresh litter and decomposed organic material.
Glacial till—gravel, boulders, sand, and finer materials transported and deposited by a glacier.
Mass Movement Index (MMI)—rating used to group soil map units that have similar properties with respect to the stability of natural slopes.
Mass movement—general term for a variety of processes by which large masses of earth material are moved downslope by gravity either slowly or quickly.
McGilvery soil—a shallow, forested, organic soil developed over bedrock.
Muck—decomposed plant material, with little evidence of the original plant remaining.
Muskeg (peatland)—a type of bog that has developed in depressions or flat areas, poorly drained, acidic, with organic soils that support vegetation that is predominantly sphagnum mosses and sedges.
Outwash— alluvium deposited by streams originating from glaciers.
Riparian areas—encompass the zone of interaction between the aquatic and terrestrial ecosystems, and include riparian streamsides, lakes, and floodplains with distinctive resource values and characteristics.
Riparian Management Area (RMA)—the area including water, land, and plants adjacent to perennial streams, lakes, and other bodies of water that is managed for the inherent qualities of the riparian ecosystem.
Sediment—solid materials, in suspension or transported by water, gravity, ice, or air.
Slip plane—surfaces along which differential movement takes place in soil or rock.
Soil productivity—capacity of a soil to produce plant growth, due to the soil's inherent chemical, physical, and biological properties.
Till—gravel, boulders, sand, and finer materials transported and deposited by a glacier.
V-Notch—a shallow to deeply cut stream drainage, generally in steep, mountainous terrain; would look like a "V" from a frontal view.

Introduction

Soils of Southeast Alaska are a fundamental part of the forest. They have evolved with the vegetation and climate and form the foundation of the forest ecosystem. The soil's integrity and stability determine the long-term productivity of the forest. The region's cool growing season temperatures and abundant rainfall greatly influence soil characteristics. Under these conditions, organic matter decomposes slowly and tends to accumulate. At the same time, nutrients are flushed from the mineral soil but are retained in the thick surface organic (duff) layer. If the duff layer is extensively disturbed, alder can invade the site and delay the regeneration of conifers.

Soil Groups

Soils are formed in either mineral materials (e.g., sand, silt, clay) or organic matter (decayed plant materials). For this analysis, soils within the Project Area are grouped by typical properties that influence the use and management of an area. Consequently, the mineral soils are discussed in general and then by more specific categories. The soils in the Project Area are composed of mineral soils (developed from decomposed rock materials) and organic soils (developed from decomposed plant materials). Within these two broad groups more specific subdivisions occur.

Five soil types are important in the Project Area: (1) the broad mineral soils group, composed mainly of sand, silt, clay, gravel, and rocks; (2) mineral soils formed over compact glacial till; (3) Tonowek and Tuxekan soils, made up of alluvial sand, silt, and gravel (also mineral soils); (4) organic soils, composed of decomposing plant tissues (muck); and (5) the McGilvery soil series, which is also an organic soil. This latter soil is composed of a thin, well drained layer of organic material overlaying bedrock. Figure 3-2 summarizes a variety of the characteristics of these soil groups. Appendix D of the Draft EIS displays the acres of these soil groups by watershed. Figure 3-3 is a map of the major watersheds in the Project Area.

Mineral Soils

Mineral soils originate from deposits of glacial till, outwash, lake deposits, alluvium, and colluvium. These soils have a potential for landslides when they occur on steep slopes. The mineral soil surface typically consists of partially decomposed organic material. Soil depths range from less than 20 inches to more than 20 feet. Drainage ranges from well to very poorly drained. These soils typically support a hemlock or hemlock-spruce vegetation series. Sites that drain poorly often support a mixed-conifer or western red cedar series. The glacial till and Tonowek and Tuxekan soils are also mineral soils. Mineral soils make up about 48 percent of the Project Area or 81,323 acres.

Glacial Till Soils

Glacial till soils are a type of mineral soil that formed in compact, poorly sorted deposits of glacial origin. These soils are typically found on lower valley sidewalls and low ridge tops. They are of management concern because of the potential for landslides. The dense, compact glacial till that underlies these soils is relatively impermeable. Water accumulates in the subsoil at the contact with this dense till, forming a layer that is relatively unstable and susceptible to sliding. They typically support western hemlock and yellow cedar forest types. Glacial till soils make up about 30 percent (50,868 acres) of the Project Area.

Tonowek and Tuxekan Soils

Tonowek and Tuxekan soils are a type of mineral soil found on stream bottoms, alluvial fans, and floodplains. In the floodplain zones near rivers, soils tend to be more poorly developed because of repeated sediment deposition during floods. They typically support a riparian community of water-dependent plants including Sitka spruce, devils club, and red alder. Tonowek and Tuxekan soils previously harvested for timber are now in various stages of secondary plant succession. About 1 percent of the Project Area (2,131 acres) is made up of these soils.

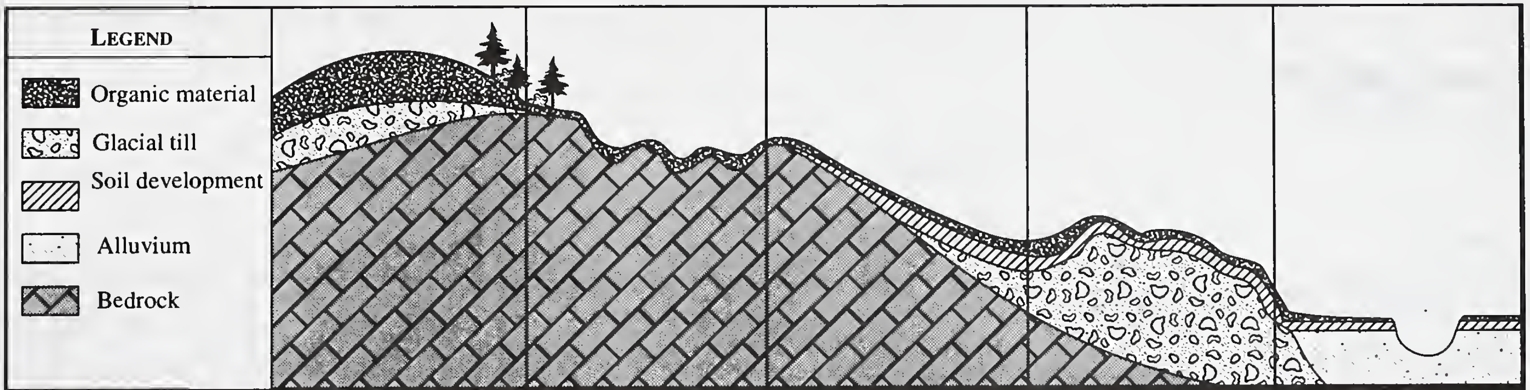
Organic Soils

Organic soils, common and widely distributed in the Project Area, are generally found on glacial deposits on relatively flat valley bottoms. Forested organic soils range from well to very poorly drained. Non-forested organic soils are usually poorly or very poorly drained. They range from about 3 inches to over 40 feet in depth. Organic soils in Southeast Alaska typically support a mixed conifer, western hemlock-yellow cedar, western hemlock-red cedar, or shore pine vegetation series. If non-forested, they support a muskeg or alpine meadow community. About 52 percent of Project Area soils (87,738 acres) are organic.

McGilvery Soils

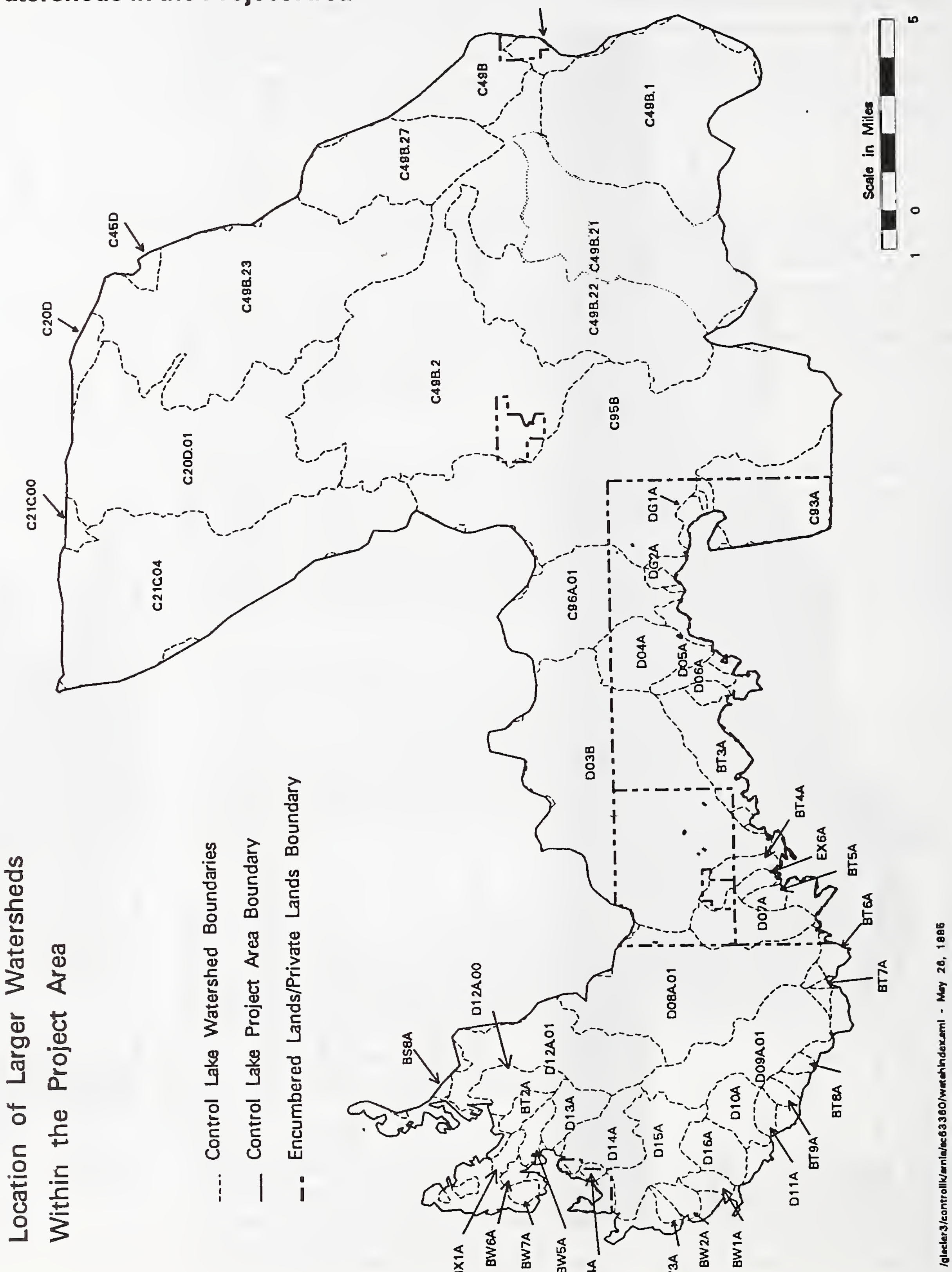
McGilvery soils are a type of organic soil that is well-drained and typically supports western hemlock or western hemlock intermixed with cedar and spruce. Because of its shallow depth, disturbance of the soil surface may result in exposure of the underlying bedrock. Previously, soil mapping units with greater than 41 percent McGilvery soils were removed from the tentatively suitable (for timber production) land base due to possible restocking problems. However,

Figure 3-2
Soil Characteristics of Project Area



	Organic		Mineral		
	Organic (General)	**McGilvery**	**Mineral (General)**	**Till**	**Tonowek and Tuxekan**
Description	Thick layer, partly to completely decomposed plant materials	Forest litter and partly decomposed plant material over bedrock	Shallow to deep soils developing in residuum or colluvium	Thin surface, soils developing in glacial till	Shallow to deep soils of stratified sand and gravel
Texture	Peat, mucky peat, muck	Peat, mucky peat	Sandy loam to silt loam	Sandy loam to silt loam	Sand and gravel
Soil Depth	7" to > 6'	< 8"	1' to > 6'	< 20" to < 6'	> 6'
Drainage	Poorly and very poorly drained	Well drained	Well to poorly drained	Well to poorly drained	Well to moderately well drained
Major Forest Types	Nonforest and varied forest types	Western hemlock	Western hemlock, mixed conifer	Western hemlock, Western hemlock/ yellowcedar	Sitka spruce
Landform	Ridgetops, benches, depressions, valley floor	Upper backslopes of hills and mountains	Valley floors, hillslopes, mountain sideslopes, ridge slopes	Moraines, drumlins, valley floor deposits	Floodplains, stream stream terraces
Mass Movement Index Class	Generally low	Low	Low to very high	Low to very high	Low
Timber Site Productivity Class	Low to moderate	Medium to high	Medium to high	Medium to high	High
Wetland Habitat Potential	High	Low	Medium	Medium	Very high
Upland Habitat Potential	Low	Medium	High	High	Very high

Figure 3-3
Major Watersheds in the Project Area



they are now considered tentatively suitable and harvest is allowed on a case-by-case basis, since previous harvest using partial suspension on these soil series has been successfully regenerated. About 4 percent (6,975 acres) of the Project Area is made up of these soils.

Soil Productivity

Soil productivity, which is the inherent capacity of a soil to support the growth of specific plants or plant communities (FSM 2554.03), is critical to the forest because it affects the productivity of most other forest resources. Tree growth and wildlife and fish habitat are often associated with soil productivity (the soil component of long-term site productivity). In the Project Area, timber site productivity of mineral soils ranges from very high on floodplains, till plains, and most other lowlands, to medium to high on moderately well- to well-drained soils, to low on somewhat poorly to very poorly drained soils. Timber site productivity on poorly and very poorly drained organic soils, regardless of elevation or exposure, is generally much lower than the productivity of mineral soils.

Timber management activities can influence soil productivity and its related nutrient content in a number of ways. Landslides, surface erosion, severe logging disturbance, or displacement by roads, skid trails, landings, or rock pits can cause removal of the surface layer. Soil damage can also result from compaction or puddling, which impairs soil porosity and drainage, and reduces productivity. Changes in soil productivity that last beyond the planning period are considered to be significant impairments. A 15 percent reduction in inherent soil productivity potential is the threshold used for setting values for change in measurable or observable soil properties associated with long-term productivity (FSM 2554.03).

Erosion

Two major types of erosion—surface erosion and landslides—occur in the Project Area and are influenced by timber harvest activities.

Surface Erosion

Two types of surface erosion occur as a result of timber harvest—surface erosion on the harvested areas and road surface erosion. In the forested areas of Southeast Alaska, the organic mat and mineral soil can absorb rainfall even at the highest precipitation levels. Consequently, overland flow by water and any resulting surface erosion of soil particles by processes such as sheetflow, rill, and gully erosion is uncommon. However, erosion can occur when mineral soils are exposed. The rate of erosion depends primarily on the amount of vegetation groundcover, erodibility of the soil, and slope steepness.

Road erosion contributes far more to stream sedimentation than does surface erosion. Road surfaces are barren and traffic breaks down the sublayers of roads into fine particles, producing sediment. Also, roads are often hydraulically connected to streams by drainage ditches. At stream crossings, roads can contribute significant amounts of fine sediment to drainages (Reid and Dunne, 1984). The amount contributed depends greatly on use. Excessive road and surface erosion results in the introduction of fine sediment to stream gravels which can affect fish spawning, growth, and habitat (see *Water, Fish, and Fisheries* Section).

Some of the Project Area is extensively roaded from previous logging operations. Most of the roads are in the lower Logjam Creek area, in the vicinity of Control Lake, or in the Steelhead and Rio Beaver Creek watersheds.

Areas with timber harvest occur along the lower Thorne River area, at the northern end of the Western Peninsula, and in watershed C49B.2700. Surface erosion is uncommon in Southeast Alaska because of the thick duff layers protecting the soil. Use of BMP's during timber harvest minimizes exposure of mineral soil.

Landslides

Landslides are the main source of hillslope erosion in Southeast Alaska. Many landslides occur during or immediately after periods of heavy rainfall when soils are saturated (Swanston, 1969).

Landslides usually occur on steep slopes that have soils with distinct subsurface "slip" layers (slip-planes), such as compact glacial till or bedrock that parallels the ground surface. These areas have a high likelihood of naturally occurring landslides or landslides caused by blasting rock or road pioneering, side casting of excavated material, or logging practices that cause substantial surface disturbance.

Landslides in the Project Area consist of two main types: debris flows and debris avalanches (Swanston, 1969). Debris avalanches are shallow failures, limited mostly to the colluvial and soil layers. These landslides begin on steep slopes and commonly enter steep drainages, picking up moisture and becoming debris flows. Prince of Wales Island has one of the higher landslide frequencies in Southeast Alaska (Swanston, 1969). Swanston and Marion (1991) showed that in clearcut areas on Prince of Wales Island landslides occurred at a rate 3.5 times greater than that on undisturbed slopes.

The Forest Service's classification system for landslide hazards is the Mass Movement Index (MMI). The system ranks site characteristics, soil types, and slope angle into four categories of hazards—MMI1 through MMI4—corresponding to low, moderate, high, and very high landslide hazard. Soils with a very high MMI are excluded from the tentatively suitable Commercial Forest Land (CFL) base and are not harvested. Most of the MMI3 and MMI4 soils in the Project Area are in the four mountainous regions: the northern portions of the Klawock Range, the Rio Beaver and Rio Roberts watersheds (Watersheds C49B.2100 and C49B.2200), the Kogish Peak area, and the unnamed mountains to the northwest of the Thorne River.

Mass Movement Index (MMI)

MMI ratings tell how susceptible soil groups are to landslides under natural conditions.

MMI1 - low potential
MMI2 - medium potential
MMI3 - high potential
MMI4 - very high potential

Of 140 landslides identified during a 1993 storm on Prince of Wales Island, 87 percent started in MMI3 soils, while none began in MMI4 soils (USDA Forest Service, 1994a). Analysis showed that 71 percent of the landslides were in harvested areas. However, the acreage of land disturbed by the slides was only 20 percent higher in harvested areas than in old-growth areas. This is likely because landslides originating in old growth tend to be larger (Swanston and Marion, 1991).

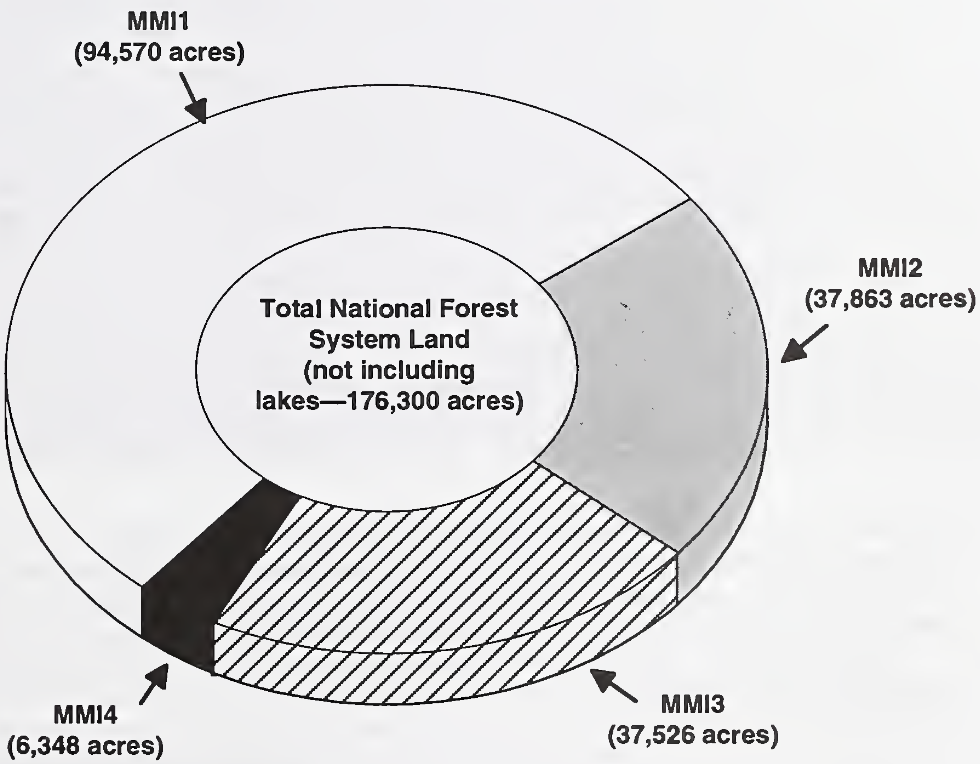
Management-related landslides in Southeast Alaska have two sources: harvested slopes and logging roads. When an area is logged, the tree roots, an important part of the cohesive strength of the soil, gradually deteriorate. After three to seven years, the root strength on hillslopes reaches a minimum (Swanston, 1969). Soils in logged areas also tend to be more saturated in the spring than their unharvested counterparts because of more snow accumulation and less moisture loss through evapotranspiration. This may increase the potential for failure by increasing shear stress and reducing soil strength.

Logging roads can be a major source of landslides, often because of improper road drainage. The volume of sediment from road-related landslides can be several orders of magnitude greater than sediment from the road surface. Several studies in the Pacific Northwest indicate that roads cause many more landslides than the timber harvest (Megahan and Kidd, 1972; Lyons and Beschta, 1983). However, data collected by Swanston and Marion (1991) show that in Southeast Alaska only 13 percent of the management-related landslides were associated with roads.

Figure 3-4 shows the MMI classification distribution for soils in the Project Area. Most of the Project Area soils fall within the MMI1 category (54 percent), which also includes some unclassified wetland areas. MMI2 and MMI3 soils make up about 21 percent of the Project Area each and only about 4 percent carry a MMI4 rating. Field verification added about 1,040 acres to the MMI4 layer.

In addition to MMI4 soils, areas with slope gradients of 72 percent or more are considered unstable under the Forest Plan. Due to the high risk of soil mass movement and accelerated erosion of Class IV stream channels on steep slopes, these areas are removed from the tentatively suitable timber base; harvest is permitted only on a case-by-case basis after on-site analysis. Based on GIS data, approximately 2,400 acres or just over 1 percent of the National Forest System lands in the Project Area have slopes greater than 75 percent.

Figure 3-4
Soils by Mass Movement Index



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Wetlands, Floodplains, and Riparian Areas

Key Terms

Aquatic ecosystems—the stream channel, lake or estuary bed, water, biotic communities, and the habitat features that occur therein.

Channel type—the defining of stream sections based on relief, landform, and geology.

Estuarine—deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land, but which have open, partly obstructed or sporadic access to the open ocean, and in which ocean water is diluted by freshwater runoff.

Forested wetlands—wetlands that have forest cover.

Hydrophytic vegetation—plants typically found in wetlands and dependent upon wetland moisture regimes for growth and reproduction.

Muskeg (peatlands) —a type of bog that has developed in depressions, or flat areas, poorly drained, acidic, with organic soils that support vegetation that is predominantly sphagnum mosses and heaths.

Primary succession—vegetation development that is initiated on surface exposed for the first time, which has never supported vegetation before.

Riparian areas—encompass the zone of interaction between the aquatic and terrestrial ecosystems, and include riparian streamsides, lakes, and floodplains with distinctive resource values and characteristics.

Riparian Management Area—the area including water, land and plants adjacent to perennial streams, lakes and other bodies of water that is managed for the inherent qualities of the riparian ecosystem.

Secondary succession—the process of reestablishing vegetation after normal succession is disrupted by fire, cultivation, timber harvest, windthrow, or any similar disturbance.

Wetlands—areas that are inundated by surface or ground water with a frequency sufficient, under normal circumstances, to support vegetation that requires saturated or seasonally saturated soil conditions for growth and reproduction.

Wetlands

Wetlands are defined as "those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (40 CFR 230.41(a)(1)). Federal agencies having statutory authority over Federal lands are required to preserve or enhance the natural and beneficial values of wetlands in carrying out their responsibility to (1) acquire, manage, and dispose of lands and facilities; (2) provide Federally undertaken, financed, or assisted construction and improvements; and (3) conduct Federal activities and programs affecting land use (42 U.S.C. 4321 et seq.).

The U.S. Army Corps of Engineers Wetlands Delineation Manual (COE, 1987) provides the standard for determining a site's wetland status. In addition, DeMeo and Loggy (1989) have developed wetland identification specific to Southeast Alaska's vegetation communities. Under COE (1987), sites are considered wetlands when they meet criteria regarding soil, hydrology, and vegetation. Generally, wetlands are those sites that remain water-saturated long enough for hydrophytic vegetation to dominate and certain soil characteristics to develop. The DeMeo and Loggy (1989) procedure, which is used here, evaluates the vegetation and soil layers of the GIS database and then assumes the presence of the wetland hydrological criteria. Their procedure calculates wetland acreage based on the general percentage of the vegetation and soil types within mapping units and includes lakes, ponds, estuaries, streams, muskegs, and forested wetlands. Consequently, this procedure generates an acreage of potential wetlands rather than a wetland delineation and associated acreage.

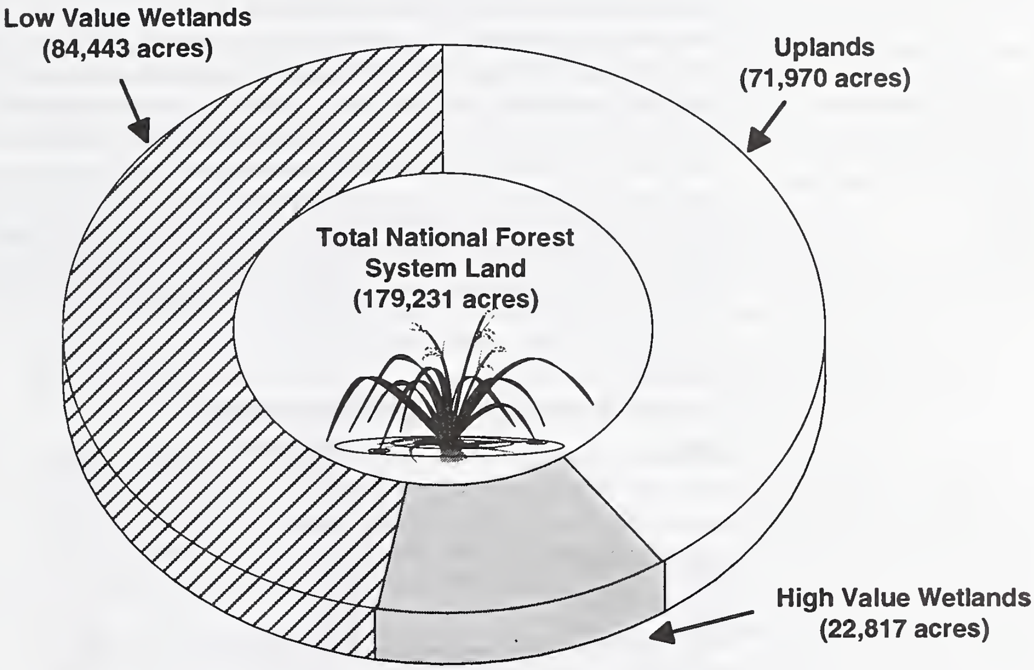
Wetland Types

Types of wetlands include estuaries, lakes and ponds, and other plant communities formed on both mineral and organic soils (Cowardin et al., 1979). Streams and rivers are also considered wetlands. The major wetlands in Southeast Alaska are made up of both forested sites on poorly drained organic and mineral soils and nonforested, herbaceous plant-dominated sites on organic soils (muskegs or peatlands). Forested wetlands and muskegs make up the majority of the wetlands of the Project Area. Small estuaries including muddy subtidal areas are located at the mouths of the several unnamed streams that flow into Nossuk and Salt Lake bays on the Western Peninsula. Estuarine wetlands make up a small amount of wetlands in the Elevenmile, Salt Lake Bay, and Nossuk Bay areas. Lakes and ponds are widely distributed over the Project Area and have highest density along the Honker Divide of the Thorne River and Hatchery Creek drainages. They can have deepwater or shallow nearshore habitat. Major lakes included the Twin and Thorne lakes of the Thorne River, Lakes Galea and Butterfly of Hatchery Creek, Control and Balls lakes of the Control Lake Creek drainage, Cutthroat Lakes of Cutthroat Creek, Snakey Lakes of the North Thorne River, and Angel and Foot lakes of Goose Creek. A more detailed description of lakes can be found in Appendix D in the Draft EIS.

Certain types of forested wetlands are now given greater protection under the new Forest Plan (see ROD for TLMP 1997). These wetlands are those occurring on Kaikli, Karheen, Kitkun, and Maybeso soil series. They are now given greater protection because the scientific information

Muskeg

Figure 3-5
Wetland Acres in Project Area



related to the effects of timber harvesting on these soils is incomplete and specific concerns exist. Harvesting timber on these soil types is to be avoided except for small inclusions of these soils (2 acres or less) within a unit. In the Project Area these soils are found in greatest abundance (based on GIS analysis of soil associations and complexes) in the Logjam Creek (C21C), Hatchery Creek (C20D), Upper Thorne River (C49B.23), Control Creek (C49B.20,.24,.25), Elevenmile (D09A), and adjacent (D08A) watersheds.

Wetland Values and Functions

Wetlands are associated with significant values and functions (Reppert et al., 1979). Values are socioeconomic and include wildlife viewing and harvest, commercial fishing, development, community water supplies, actual and potential recreation, and timber harvest. Functions are ecosystem attributes and can be organized as follows:

- Physical functions—flood conveyance and retention, coastal erosion barriers, groundwater recharge and discharge, heat absorption, and sediment collection.
- Chemical functions—acidic water pH levels, high tannins, and the ability to accumulate significant carbon and nitrogen.
- Biological functions—timber production (generally in lower volume classes), provision of critical habitat for fish (notably salmon) and wildlife (notably waterfowl and bears), and provision of habitat for unique plant communities.

Wetland types in the Project Area considered to be of high value (primarily for biological reasons) include all estuarine wetlands, emergent tall and short sedge muskegs, sphagnum muskegs, and wet forest/sphagnum muskeg complex. Based on GIS analysis, there are 22,817 acres of high value wetlands on National Forest System lands in the Project Area (Figure 3-5). High value and other wetlands are mapped in the Project Area on the road card maps (Appendix E).

Floodplains

The 1997 TLMP further subdivided Class III streams into Class III and Class IV streams. See the Glossary for the current definitions.

Floodplains usually contain sediments carried by the stream or river and deposited in slack-water areas adjacent to the channels during periods of high water. Floodplains are defined as areas subject to a 1 percent (100-year recurrence) or greater chance of flooding in any given year. They generally are associated with larger streams such as the Thorne River, as well as Hatchery, Rio Roberts, and Rio Beaver creeks. Significant floodplains are usually associated with Class I streams, although larger Class II streams can form floodplains. Class III/IV streams rarely have floodplains. Nutrient-rich sediments underlain by coarse, well-drained sediments make floodplains the most productive lowland timber sites on the Project Area. They typically support a Sitka spruce series or shrub plant communities. No flood hazard studies have been conducted for the Project Area. Table 3-3 shows the acreage of significant Project Area floodplains by watershed (refer to Figure 3-3 for a map of major watersheds in the Project Area).

Table 3-3

Project Area Floodplains (in acres)[1/]

Name	Watershed	Floodplains
	000Z	17
103-80-37	BT2A	8
Hatchery Creek	C20D	91
Logjam Creek	C21C	56
North Thorne River	C45D, C49B.2700	71
Thorne River	C49B, C45D	1,338
	C49B	202
	C49B.0001	64
Goose Creek	C49B.1000, C49B.1100	
	C49B.1200	40
Control Creek	C49B.2000, C49B.2400	
	C49B.2500, C49B.2600	304
Rio Beaver	C49B.2100	141
Rio Roberts	C49B.2200	284
Upper Thorne River	C49B.2300	233
Steelhead Creek	C95B	453
Election Creek	C96A	45
103-60-05	D08A	66
103-80-50	D15A	37
James Creek	D16A	21
Total Project Area[2/]		2,131

SOURCE: Forest Service, Ketchikan Area, GIS database.

1/ Watersheds not in the table do not have mapped floodplain acreages.

2/ The floodplain acreage listed for Thorne River includes acreages for its component watersheds, including North and upper Thorne Rivers.

Floodplains can be sensitive to road-building and timber-harvesting activities. These activities can modify the ability of floodplains to store and route flood waters and alter stream channel morphology. Such modification can change the nature and ability of the channel to route sediment and water by eliminating woody debris (Smith et al., 1993) and varying water and sediment inputs.

Executive Order 11988 directs Federal agencies to lead and take action to the extent possible to prevent the long- and short-term adverse effects caused by occupying and modifying floodplains. Agencies are required to (1) avoid the direct or indirect support of floodplain development whenever there are practicable alternatives; (2) evaluate the potential effects of any proposed action on floodplains; (3) ensure that planning programs and budget requests consider flood hazards and floodplain management; and (4) prescribe procedures to implement the policies and requirements of the Order.

Riparian Management Areas

The NFMA, Section 219.27 (12)(e), requires that Riparian Management Areas be established to conserve soil and water resources and to prevent permanent impairment of the productivity of the land. Riparian Management Areas are not zones of exclusion; rather, they are areas where topography, vegetation, soil, climatic conditions, management objectives, and other factors are to be considered in determining management practices and constraints. Riparian Management Areas comprise the aquatic and riparian ecosystem, and the adjacent floodplain, wetlands, and upland areas with potential to deliver sediment to channels.

Riparian Management Areas have distinctive resource values and characteristics. Riparian vegetation is important in maintaining stream bank stability and floodplain integrity. Such vegetation slows water velocity on the floodplain while its roots inhibit erosion along stream and river banks. Riparian vegetation provides shade, leaf, and needle litter which fuels aquatic food chains, and large woody debris (LWD), an important component of instream fish habitat.

Standards and guidelines described in the 1997 TLMP include several levels of riparian and stream protection: minimum TTRA buffers, extended-width, no-cut buffers to cover the Riparian Management Area, an additional area managed to provide for windfirmness of the Riparian Management Area, and other BMP's prescribed in the field based on site-specific analysis. The TTRA requires riparian buffers of no less than 100 feet horizontal distance on each side of all Class I streams and those Class II streams that flow directly into Class I streams. Extended-width, no-cut buffers to cover the Riparian Management Area are applied as identified in the stream process group direction (RIP 2, III, E) of the Riparian standards and guidelines (TLMP, 1997). Site-specific adjustments to these extended-width buffers may be made after a watershed analysis is completed and as long as stream process group objectives can be met. In addition to no-cut buffers, the standards and guidelines of the new Forest Plan (1997) require that an area beyond the no-cut buffers be managed to provide for a reasonable assurance of windfirmness of the Riparian Management Area. Special attention is to be paid to the area within one site-potential tree height of the Riparian Management Area. Tables 3-4 and 3-5 show Riparian Management Area acreages and areas of previously harvested Riparian Management Area in the Project Area.

Table 3-4
Riparian Management Area in the Control Lake Project Area (acres)[1/]

Name	Watershed	Class I Stream	Class II Stream	Class III Stream	Lake	Riparian Soils	Totals
	000Z	67	26	20	0	14	127
	BS7A	6	5	0	0	0	11
	BS8A	22	0	0	0	0	22
	BT1A	5	0	0	0	0	5
103-80-37	BT2A	39	39	26	0	5	109
103-60-03	BT6A	9	0	0	0	0	9
103-60-01	BT7A	12	0	0	0	0	12
	BT8A	8	12	2	0	0	22
	BT9A	0	11	5	0	0	16
103-70-03	BW1A	21	48	13	0	0	82
103-80-56	BW2A	27	38	1	0	0	66
103-50-53	BW3A	9	4	4	0	0	17
	BW4A	0	0	1	9	0	10
103-80-42	BW5A	34	8	18	0	0	60
	BW6A	17	6	2	0	0	25
	BW7A	5	0	0	34	0	39
	BW8A	7	0	0	0	0	7
	BW9A	15	0	0	10	0	25
	BX1A	12	6	0	34	0	52
Hatchery Creek	C20D	984	552	343	433	46	2,358
Logjam Creek	C21C	1,511	562	341	436	22	2,872
	C26C	0	0	0	0	0	0
North Thorne River	C45D, C49B.2700	761	27	38	389	26	1,241
	C49B	214	0	0	26	134	374
	C49B.0001	194	3	0	0	42	239
Goose Creek	C49B.1000,.1100,.1200	839	132	379	297	23	1,670
Control Creek	C49B.2000,.2400,.2500.,2600	1,761	521	676	410	148	3,516
Rio Beaver	C49B.2100	636	220	442	30	60	1,388
Rio Roberts	C49B.2200	911	489	254	47	112	1,813
Upper Thorne River	C49B.2300	1,254	282	572	430	72	2,610
East Goose Creek	C70A	0	3	2	0	0	5
Paul Young Creek	C72A	18	4	2	0	0	24
Anderson Creek	C73C	11	0	8	11	0	30
	C74B	0	0	0	0	0	0
Black Bear Creek	C93A	0	0	115	0	0	115
Steelhead Creek	C95B	851	691	1,416	39	272	3,269
Election Creek	C96A	158	165	421	12	21	777
Staney Creek	C97C, C99C,B59C	7	4	7	0	0	18
	D01B	3	0	0	0	0	3
Shinaku Creek	D03B	170	438	581	91	0	1,280
103-60-25	D04A	0	0	24	0	0	24
103-60-07	D07A	0	0	1	0	0	1
103-60-05	D08A	742	381	485	50	13	1,671
Elevenmile Creek	D09A	383	264	53	48	0	748
Goodrow Creek	D10A	135	11	39	0	0	185
	D11A	7	0	5	0	0	12
Nossuk River	D12A	589	251	245	0	0	1,085
103-80-44	D13A	23	5	73	0	0	101
103-80-46	D14A	74	20	80	0	0	174
103-80-50	D15A	148	164	45	16	18	391
James Creek	D16A	44	130	18	0	7	199
Total Project Area		12,743	5,522	6,757	2,852	1,035	28,909

Source: USDA Forest Service Ketchikan Area, database.

[1/] Unlisted watersheds do not have subject criteria.

Note: Class IV streams do not have RMAs.

Table 3-5

Previously Harvested Project Area Riparian Management Area (acres)[1/]

Name	Watershed	Class I Stream	Class II Stream	Class III Stream	Lake	Riparian Soils	Totals
	000Z	6	2	0	0	0	8
	BS7A	0	2	0	0	0	2
	BS8A	7	0	0	0	0	7
103-80-37	BT2A	6	3	5	0	0	14
Hatchery Creek	C20D	0	0	8	0	0	8
Logjam Creek	C21C	42	34	7	2	2	87
North Thorne River	C45D,C49B,2700	49	5	1	1	0	56
	C49B	0	0	0	1	1	2
	C49B.0001	62	0	0	0	11	73
Goose Creek	C49B.1000,.1100,.1200	28	6	64	12	3	113
Control Creek	C49B.2000,.2400, .2500,.2600	17	24	8	1	0	50
Rio Beaver	C49B.2100	230	83	176	12	14	515
Rio Roberts	C49B.2200	0	1	3	0	0	4
Upper Thorne River	C49B.2300	19	0	13	0	0	32
East Goose River	C70A	0	3	0	0	0	3
Steelhead Creek	C95B	65	32	126	1	16	240
Election Creek	C96A	7	23	54	0	0	84
Staney Creek	C97C,C99C,B59C	0	0	0	0	0	0
Nossuk River	D12A	31	41	18	0	0	90
103-80-44	D13A	1	0	0	0	0	1
103-80-50	D15A	0	0	0	0	3	3
Total Project Area		570	259	483	30	50	1,392

Source: USDA Forest Service Ketchikan Area, database.

[1/] Unlisted watersheds do not have subject criteria.

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Water, Fish, and Fisheries

Key Terms

Adfluvial—fish that ascend from freshwater lakes to breed in streams.
Alevin—newly hatched salmon that are still attached to the yolk sac.
Alluvial fan channel—a fan-shaped deposit of sand, gravel, and fine material made by a stream where it runs out onto a level plain or meets a slower stream.
Anadromous—fish that ascend from the sea to breed in freshwater streams.
Aquatic Habitat Management Unit (AHMU)—areas for managing the resources associated with streams and lakes.
Bedload—sand, silt and gravel, or soil and rock debris rolled along the bottom of a stream by moving water.
Best Management Practices (BMPs)—land management methods, measures or practices intended to minimize or reduce water pollution.
Biotic—living.
Channel types—the defining of stream sections based on watershed runoff, landform relief, and geology.
Estuary—relatively flat, intertidal, and upland areas where saltwater meets fresh water, as at the heads of bays and the mouths of streams.
Large woody debris (LWD)—any large piece of relatively stable woody material having a diameter of at least 10 centimeters and a length greater than one meter that intrudes into a stream channel; also called Large Organic Debris (LOD).
Management Indicator Species (MIS)—species whose population changes are believed to best indicate the effects of land management activities; fish MIS for the Control Lake EIS are coho and pink salmon and Dolly Varden char.
Mitigation—measures designed to counteract environmental impacts or to make impacts less severe.
NTU—nephelometric turbidity units, a unit of measurement based on the amount of light transmitted through water.
Resident fish—non-migratory fish that complete their entire life cycle in fresh water.
Salmonid—refers to the group of fish to which salmon belong.
Sediment—water-transported earth materials (e.g., gravel, sand, silt).
Smolt—a juvenile salmon, trout, or Dolly Varden migrating to the ocean and undergoing physiological changes to adapt its body from a freshwater to a saltwater environment.
Solute—substance dissolved in a solution.
Stream flow regime—the characteristic discharge of water from a watershed that occurs in the natural stream channel.
Stream order—the designations (first, second, third, etc., stream order) is of the relative positions of stream segments in a drainage basin network with the smallest, unbranched, intermittent tributaries terminating in an outer point designated as first order streams; the junction of two first order stream segments produces a second order stream segment; the junction of two second order stream segments produces a third order stream segment, etc.
Third order watershed—a watershed that contains a third order stream segment.
Turbidity—an indicator of the amount of sediment suspended in water.
V-notch—a deeply incised, narrow valley along a drainage with a characteristic "V" shaped cross-section.
Watershed—area that contributes runoff water to a waterway.

Introduction

The water resources of the Control Lake Project Area comprise interacting physical and biological components. Watersheds form the fundamental landscape units, collecting precipitation and delivering water, sediments, and nutrients to streams. The physical components of watersheds include climate and precipitation, soil, hillslopes, streams, wetlands, and riparian areas including floodplains. Biological factors important to Project Area watersheds include forest and plant processes, riparian vegetation that directly affects fishery habitat along streams, and human activity that modifies the physical and biological makeup of the watershed. The biological processes affect soil development and stability within the terrestrial environment, while adding nutrients and structural elements to the aquatic environment. Physical processes and human activities within watersheds affect aquatic life by influencing the quantity, quality, and rate of water and sediment delivery in streams.

This section deals with the water resources and aquatic life aspects of watersheds. The *Soils and Wetlands, Floodplains, and Riparian Areas* sections discuss several other watershed features.

The Project Area includes all or part of approximately 42 major watersheds (see Figure 3-3), 29 of which contain anadromous fish streams according to the ADF&G. The Thorne River-Hatchery Creek complex drains the eastern portion of the Project Area and is collectively known as the Honker Divide. The Thorne River, which exits the Project Area at Thorne Bay, contains many tributaries including the North Thorne River, and Rio Roberts, Rio Beaver, Cutthroat, and Control Lake creeks. Hatchery and Log-Jam creeks drain out of the Project Area to the northwest. Many small creeks and a few large streams drain south to Big Salt Lake in the western Project Area. These include Steelhead, Black Bear, Election, and Shinaku creeks, among others. Western and southern drainages from the low-relief Western Peninsula include Elevenmile, Goodrow, and James creeks, the Nossuk River, and numerous unnamed streams that flow into the waters of the San Christoval Channel, Salt Lake Bay, and Nossuk Bay.

The Project Area contains many hydrologic and aquatic resources. These include numerous small ponds, small- to medium-sized lakes, and large and small streams that directly or indirectly influence abundant and important fisheries resources.

Water Resources

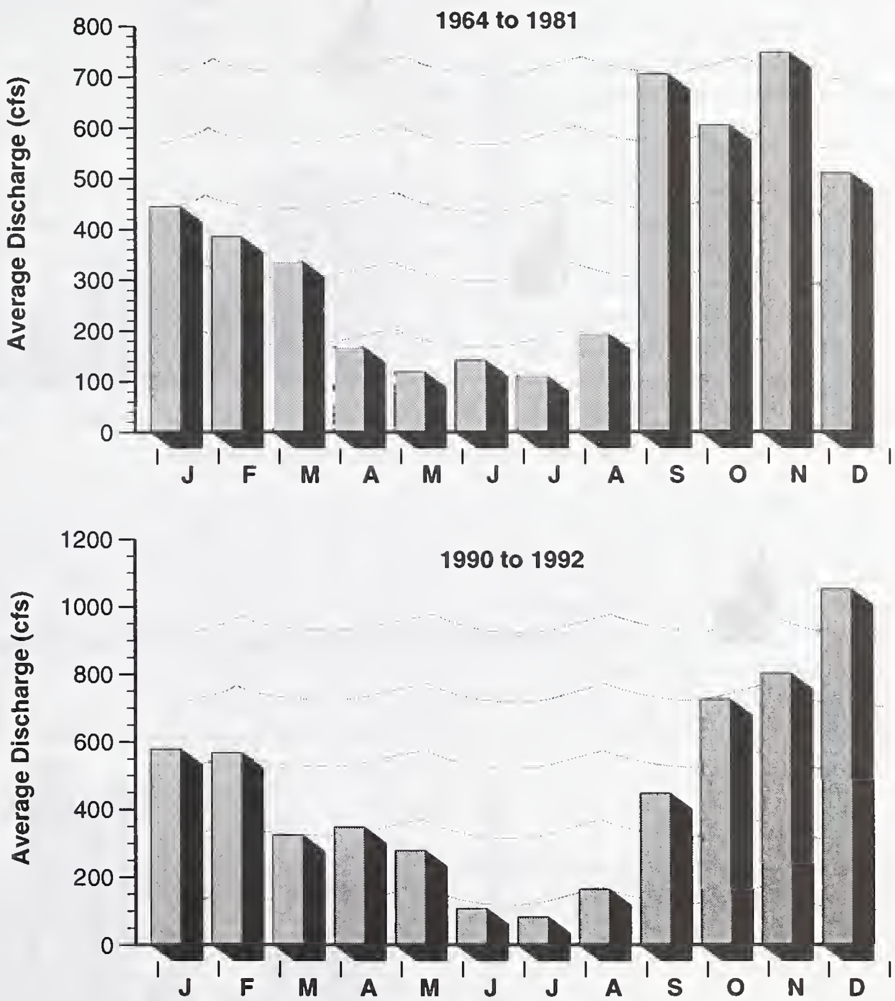
A variety of freshwater resources in addition to fisheries are present in the Control Lake Project Area. These resources are described below under the categories of hydrology, water quality, and consumptive water uses.

Hydrology

Gauges to measure stream discharge have been placed in only a few streams on Prince of Wales Island. Only the record at Black Bear Lake (USGS, 1980 to 1991) in the Project Area is long enough to be reliable. Intermittent measuring occurred on Staney Creek (USGS, 1964 to 1981, 1990 to 1992) and North Fork Staney Creek (USGS, 1991 to 1992) immediately west of the Project Area. These three watersheds vary in elevation from near sea level to 1,700 feet; thus, the effect of snow and snow melt on stream flow can be inferred.

From 1964 to 1981, the average monthly discharge for Staney Creek (measured at 2 feet above sea level) was 367 cubic feet per second (cfs). Stream flow generally appears to be dictated by seasonal precipitation variations, with highest average monthly discharge in the fall and winter months (Figure 3-6). Discharge measuring at Staney Creek resumed in 1990 slightly upstream from the original site of the gauge (elevation 47 feet).

Figure 3-6
Average Monthly Discharge of Staney Creek 1964 to 1981 and 1990 to 1992



The mean monthly discharge for the North Fork Staney Creek is 227 cfs for 1991 and 1992 measured at elevation 600 feet. The highest average monthly stream flows occur in the fall and winter with lowest flow in July (Figure 3-7). A secondary peak appears in April and May. Again, stream flow correlates with seasonal precipitation trends. The April to May stream flow peak may be related to storms during this period or to storage of winter snow precipitation above the 600-foot elevation and snow melt release in spring.

Figure 3-8 shows the average monthly discharge for Black Bear Lake for 1981 to 1991 (elevation 1,700 feet). The mean annual discharge was 28.3 cfs. Early fall discharge is influenced by seasonal precipitation. Late spring maximums and winter minimums are due to snow storage in the fall and winter and snow melt for this small, high-elevation watershed.

Figure 3-7
Average Monthly Discharge of North Fork Staney Creek

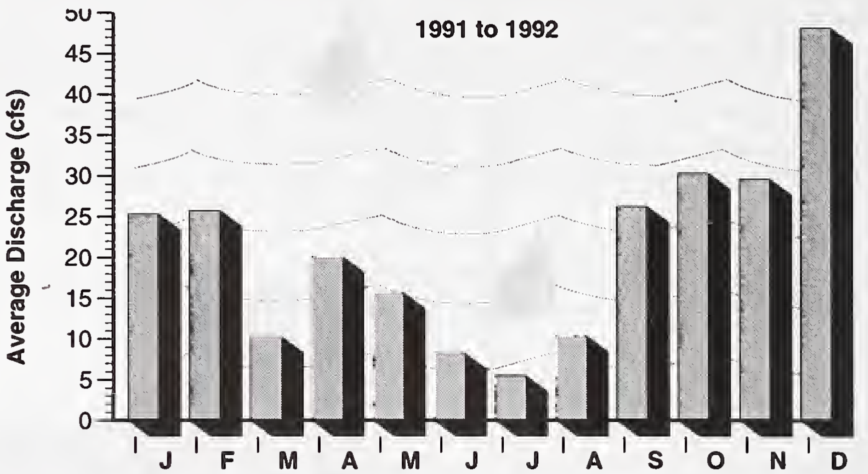
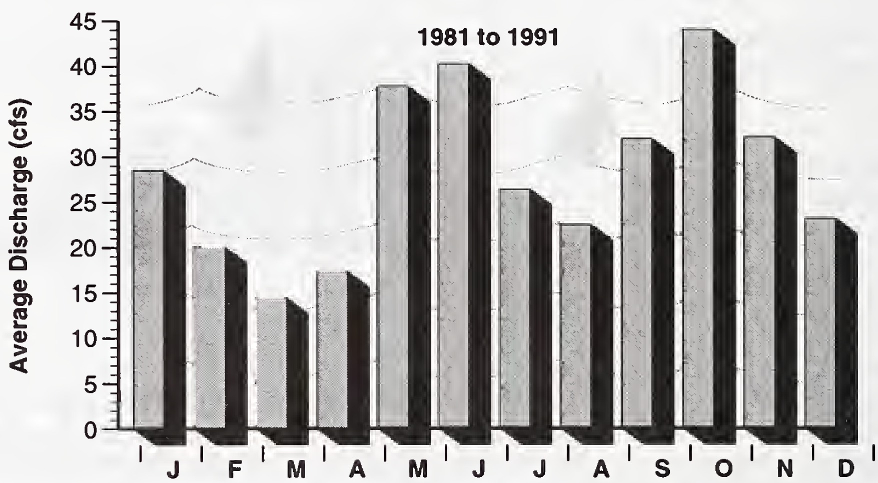


Figure 3-8
Average Monthly Discharge of Black Bear Lake



The elevation-snow relationship was not apparent in larger streams (Staney Creek). This indicates that precipitation trends dominate stream flow and the impact of spring snow melt on discharge in large, low-elevation watersheds is small. Schmiege et al. (1974) report that the Harris River, with a large proportion of its watershed in the higher elevations of Prince of Wales Island, has two high-flow periods and two low-flow periods. This would indicate that winter storage and spring snow melt is significant in large, high elevation watersheds. This seasonal distribution is likely to occur on individual streams such as Cutthroat Creek, Rio Beaver, Rio Roberts, and Goose Creek which drain highland areas. The influence of snowmelt on these individual streams on the Thorne River is likely dampened somewhat because flow from other lowland areas and extensive lake systems slow water travel time.

Land-use activities such as logging and road development also influence watersheds. Various studies show that in many instances total stream flow following rainfall and snowmelt increases when logging and road-building has occurred (Harr and McCorison, 1979; Harr et al., 1982). Low flows during dry summer months decreased following logging in one study because of a reduction in fog interception and drip after logging. These studies also demonstrate the complex interacting processes that makes predicting specific watershed responses to land-use activities difficult. The size of watersheds (roughly analogous to the order of drainage basin) and amount of activity (percent harvested and extent of road building) influences the hydrologic response.

Because of the steep slopes in the Project Area, the soil's high water transmissivity, and generally high initial moisture conditions, both small stream and river runoff generally respond quickly to rainfall events. For example, James (1956) reports that within 16 hours of a 1.25-inch rainstorm, Maybeso Creek, south of the Project Area, rose from 0.8 to 2.6 feet. Maybeso Creek, the Harris River, and Indian Creek react to precipitation almost identically (James, 1956). Base flow for these drainages is slightly different. Base flow for Maybeso Creek decreases from about 35 cfs after 10 days without rain to 13 cfs after 30 rainless days. The values for the Harris River and Indian Creek for equivalent periods are 64 and 26 cfs, and 5 and 3 cfs, respectively.

Water Quality

Sediment, water chemistry, and water temperature, all discussed below, influence water quality. Human land use activity can alter these factors. Water quality affects water use by humans, fish, and all other organisms.

Stream Sediment

Sediment is water-transported materials such as gravel, sand, and silt. Gravel and sand generally move along the stream bottom as bedload. Silt is generally transported in a suspended state and causes water to appear murky or turbid. Suspended sediment transport is limited by the availability of fine-grained material.

The *Soils* section discusses the sources of stream sediment. Fine sediment (0.1 to 4.0 mm in diameter) can reduce stream habitat quality, restrict sunlight penetration, and fill pores between gravel preventing the flow of oxygen-rich water to fish eggs. The Alaska Water Quality Standards for growth and propagation of fish, shellfish, and other aquatic life, and wildlife require that turbidity shall not exceed 25 nephelometric turbidity units (NTU) above natural levels. The standards also state that the percent of fine sediment in the gravel of anadromous or resident fish spawning waters may not be increased more than 5 percent by weight over natural conditions. In no case may that sediment range exceed a maximum of 30 percent by weight.

Data in NTU's do not exist for the Project Area, but Meehan et al. (1969) report ranges of suspended sediment for nearby Maybeso Creek of 0.0 to 148.7 ppm; Harris River, 0.0 to 46.6 ppm; and Indian Creek, 0.0 to 57.6 ppm. NTU values relate directly to parts per million of sediment; however, conversion requires that the relationship be established on a watershed-by-watershed basis (Beschta, 1980; Lloyd et al., 1987). The study of Maybeso Creek by Meehan et al. (1969) reports no statistically significant changes in suspended sediment mean or regression values before and after logging.

Reports exist on the grain size distribution of coarse stream bed sediments near the Project Area (McNeil and Ahnell, 1964; Sheridan and McNeil, 1968; and Sheridan et al., 1984). For the Harris River and Twelvemile Creek, Sheridan et al. (1984) report mean values of less than 0.83 mm sediment between 4.8 and 5.4 percent. For the Harris River, Sheridan and McNeil (1968) report mean values of less than 0.83 mm sediment between 13.9 and 14.2 percent for 1959 pre-logging samples. McNeil and Ahnell (1964) report 1959 pre-logging grain size distributions for the size range between 0.1 to 4.0 mm as 54 and 43 percent by volume for the Harris River and Twelvemile Creek, respectively. For Staney Creek, Sheridan et al. (1984) report that sediment less than 0.83 mm has mean values ranging from 7.4 to 11.0 percent before and during logging operations.

Water Chemistry

Water chemistry influences all aquatic life by providing needed nutrients and trace elements. The addition of human-made chemicals such as fertilizers used in erosion control along roads or petroleum products from vehicles or storage areas can affect water quality. Numerous samples taken throughout the entire Forest Service Ketchikan Area show that streams meet water quality standards (USDA Forest Service, 1989a). No water quality data for the Project Area exists; however, in the Polk Inlet Area to the south, laboratory measurements of pH, dissolved solids, conductivity, and chemical constituents of the streams also fall within Alaska State Water Quality Standards (Stewart and Baker, 1993).

Stream Temperature

Stream temperatures are important in regulating biologic productivity in the aquatic environment. Alaska Water Quality Standards establish upper range temperature limits of between 55.4 and 59°F for growth and propagation of fish, shellfish, and other aquatic life and wildlife. Temperature shall not exceed 68°F at any time. Stream temperatures recorded in the summer of 1993 by Project field personnel within or near potential harvest units were from 42.8 to 65.3°F (Table 3-6). The temperature data collected during the field season averaged 55.4°F, 51.6°F, and 49.1°F for Class I, II, and III streams, respectively. Including lake data increased the average Class I temperatures to 56.7°F. Individual lake temperature measurements exceeded water quality standards. These lake temperatures were taken in the shallow nearshore area where temperatures are highest. The sampling periods included a range of weather and cloud conditions during an atypical dry and warm summer. This is in contrast to the historical measurements in Maybeso Creek shortly after the removal of 25 percent of the watershed forest and clearcutting to stream bank in the 1950s. During that period, temperatures were frequently greater than 60°F, resulting in average and peak summer temperatures significantly higher, probably as a result of the harvest methods used at that time (Meehan et al., 1969).

Consumptive Uses

Key consumptive water uses within the Project Area are minor, but include development and recreational water supply. There are no Federally designated municipal watersheds within the Project Area. There is recreational water use on Federal land at Forest Service cabins at Control Lake, Black Bear Lake, and Lake Galea in the Honker Divide. These sites have no developed water supply and users must treat local surface water. The water supply for campers at Eagle's Nest Campground is hauled in by truck from Thorne Bay. Water use from streams and lakes occurs at the numerous dispersed recreational sites in the Project Area. These sites are discussed in the *Recreation, Roadless Areas, Wild and Scenic Rivers, and Wilderness Areas* sections.

Table 3-6
Stream Temperatures in the Control Lake Project Area

Stream Class	Temperature (°F) Maximum	Minimum	Average	Number of Observations
Class I	65.3	46.4	55.4	77
Class II	61.7	46.4	51.6	48
Class III	55.4	42.8	49.1	57
Class I including lakes	71.6	46.4	56.7	87

Source: Rogers and Ablow, 1995.

The Alaska Water Quality Standards (19 AAC 70) that apply to the Project Area are those for the propagation of fish, shellfish, and other aquatic life, and for wildlife. The Water Quality section above summarizes the appropriate parameters. Standards for water supply are more stringent than those for fish and wildlife. Values for turbidity shall not exceed 5 NTU above natural conditions when the natural turbidity is 50 NTU or less; there should not be more than a 10 percent increase in turbidity when the natural condition is more than 50 NTU; and values are not to exceed a maximum increase of 25 NTU. Water temperatures shall not exceed 59°F.

Fish and Fisheries Resources

Fish and aquatic resources in the Control Lake Project Area help support subsistence use and commercial and sport fisheries. These resources are important to the economy and lifestyles of area residents and visitors (see the *Subsistence* and *Recreation, Roadless Areas, Wild and Scenic Rivers, and Wilderness Areas* sections).

Project Area streams contain important anadromous and resident fish habitats. The streams support four species of anadromous salmon (pink, chum, coho, and sockeye) as well as resident kokanee, cutthroat trout, rainbow/steelhead trout, and Dolly Varden char. King salmon are found in the inlets and bays of the Project Area, but do not spawn in its streams. These species are important to the commercial, recreational, charter boat/lodge, and subsistence fishery of the region. These fish also are a major food resource for black bears, river otters, eagles, and other wildlife. Other nongame species, including sculpin, sticklebacks, and smelt, are also present in the Project Area's streams and waters (Taylor, 1979).

Anadromous fish spend part of their life in fresh water and part in salt water. Salmon lay their eggs in stream gravels, and the juvenile fish hatched from the eggs emerge from the gravels. The amount of time the juveniles spend in fresh water depends on the species of salmon. Pink salmon start their downstream migration immediately after emergence, while coho salmon juveniles generally spend two years in fresh water before migrating to the ocean. Pink and chum salmon depend heavily on estuaries during their early life stages. Salmon reach maturity in the ocean, returning to their natal streams to spawn and die and start the cycle again. Steelhead trout follow a cycle similar to coho salmon, except they often survive the spawning season, return to the ocean, and spawn again. Resident trout, char, and kokanee spend all of their lives in fresh water, spawning in stream gravels and growing to maturity in the streams and lakes of the area.

Estuaries are important aquatic resource areas; they form transitions between terrestrial, freshwater, and marine environments. Estuaries are rich and diverse, harboring many resident species and providing food, spawning areas, or shelter for numerous other species including anadromous salmon and trout at critical points in their life cycle (USDA Forest Service, 1985). In the Control Lake Project Area, estuaries and the surrounding waters contain crab, shrimp, clams, mussels, and various marine fishes. These regions are important as nursery areas for the young of these marine species. Herring and smelt also use these areas for spawning and feeding.

Major Project Area estuaries are found primarily at the heads of bays and inlets where major streams enter. Smaller estuaries are present at most stream mouth regions. All the estuaries found in the Project Area are located on Big Salt Lake and along the Western Peninsula.

The Project Area contains several fisheries enhancement projects. These projects include an adult fish passage facility around natural barriers on Rio Roberts Creek and habitat enhancement, including the addition of large woody debris structures, in Control Lake. Future basinwide habitat enhancements are planned for the Rio Beaver watershed including control of sediment erosion into streams, riparian vegetation planting, and culvert maintenance.

The installation of a fish pass facility at Rio Roberts Creek offers anadromous fish access to upstream habitat. The ADF&G planted cultured native Thorne River coho fingerlings above the fish pass in 4 consecutive years to seed the habitat. Recent data collected by the Thorne Bay Ranger District shows that production is now occurring above the fish pass.

Stream Classification

Stream classes are used to categorize stream channels based on their fish production values. The Forest Service uses four stream classes for the Tongass National Forest.

Stream classes are defined as follows:
Class I: Streams and lakes with anadromous or adfluvial fish habitat; or high quality resident fish waters listed in Appendix 68.1, Region 10 Aquatic Habitat Management Handbook (FSH 2609.24), June 1986; or habitat above fish migration barriers known to be reasonable enhancement opportunities for anadromous fish.

Class II: Streams and lakes with resident fish populations and generally steep (6–15 percent) gradient (can also include streams from 0–5 percent gradient) where no anadromous fish occur, and otherwise not meeting Class I criteria. These populations have limited fisheries values and generally occur upstream of migration barriers or have other habitat features that preclude anadromous fish use.

Class III: Perennial and intermittent streams with no fish populations but which have sufficient flow or transport sufficient sediment and debris to have an immediate influence on downstream water quality or fish habitat capability. These steams generally have bankfull widths greater than 5 feet and are highly incised into the surrounding hillslope.

Class IV: Intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capabilities to have an immediate influence on downstream water quality or fish habitat capability. These streams generally are shallowly incised into the surrounding hillslope.

Non-streams: Rills and other watercourses, generally intermittent and less than 1 foot in bankfull width, little or no incisement into the surrounding hillslope, and with little or no evidence of scour.

Table 3-7 shows the total mileage of Class I, II, and III streams in the Project Area by watershed.

Table 3-7
Project Area Streams by Class (in miles)

Name	Watershed	Class I	Class II	Class III	Total
	000Z	1.80	0.89	1.51	4.20
	BS7A	0.17	0.12	0.00	0.29
	BS8A	0.76	0.00	0.00	0.76
	BT1A	0.12	0.00	0.00	0.12
103-80-37	BT2A	1.12	1.43	2.65	5.21
103-60-03	BT6A	0.22	0.00	0.00	0.22
103-60-01	BT7A	0.32	0.00	0.00	0.32
	BT8A	0.23	0.40	0.14	0.77
	BT9A	0.00	0.37	0.43	0.80
103-70-03	BW1A	0.57	1.55	1.16	3.27
103-80-56	BW2A	0.68	1.32	0.08	2.08
103-80-53	BW3A	0.26	0.13	0.35	0.75
	BW4A	0.08	0.00	0.11	0.19
	BW5A	1.01	0.30	1.65	2.96
	BW6A	0.59	0.20	0.21	0.99
	BW7A	0.61	0.00	0.00	0.61
	BW8A	0.23	0.00	0.00	0.23
	BW9A	0.72	0.00	0.00	0.72
	BX1A	0.93	0.20	0.00	1.13
Hatchery Creek	C20D	40.64	19.33	28.90	88.88
Logjam Creek	21C	52.54	20.05	31.64	104.22
North Thorne River	C45D,C49B,2700	29.79	0.99	3.42	34.19
Thorne River	C49B,C45D,	226.42	61.15	208.74	496.32
	C49B	5.95	0.00	0.00	5.95
C49B.0001	6.35	0.15	0.02	6.52	
Goose Creek	C49B.1000,.1100				
Control Creek	C49B.2000,.2400, .2500,.2600	60.42	18.95	61.46	140.83
Rio Beaver	C49B.2100	17.76	7.90	39.01	64.67
Rio Roberts	C49B.2200	27.67	18.10	23.12	68.89
Upper Thorne River	C49B.2300	47.60	10.29	49.67	107.55
East Goose Creek	C70A	0.00	0.07	0.13	0.21
Paul Young Creek	C72A	0.54	0.09	0.14	0.78
Anderson Creek	C73C	0.45	0.00	0.82	1.27
Black Bear Creek	C93A	0.00	0.00	9.61	9.61
Steelhead Creek	C95B	30.57	27.20	130.08	187.85
Election Creek	C96A	4.53	6.35	37.00	47.88
Staney Creek	C97C,C99C,B59C	0.26	0.12	0.62	1.00
Shinaku Creek	D03B	6.91	15.77	52.51	75.19
103-60-25	D04A	0.00	0.00	1.91	1.91
103-60-07	D07A	0.00	0.00	0.05	0.05
103-60-05	D08A	21.35	14.59	19.87	55.80
Elevenmile Creek	D09A	11.51	7.10	4.74	23.35
Goodrow Creek	D10A	3.39	0.39	3.96	7.74
	D11A	0.21	0.00	0.44	0.66
	D12A.0001	3.61	3.82	1.99	9.41
Nossuk River	D12A	13.26	5.47	22.40	41.13
103-80-44	D13A	0.68	0.17	6.46	7.32
103-80-46	D14A	2.08	0.75	7.23	10.05
103-80-50	D15A	4.22	6.09	4.07	14.38
James Creek	D16A	1.19	4.72	1.51	7.42
TOTAL		434.84	200.13	584.84	1,219.82

Source: Forest Service, Ketchikan Area, GIS database.

Note: Class IV streams are not included due to mapping difficulties.

The Forest Service classified streams in the Control Lake Project Area based on available field data and map assessment. Where field data were not available, stream classifications were based primarily on the evaluation of maps and aerial photographs; channel types are based on definitions in USDA Forest Service (1987). The channel type definition for the Tongass National Forest is an inventory and planning tool that stratifies stream and lake sections within a watershed into different stream process groups. The process groups are based on physical characteristics of streams and predict their physical response to different management activities. The Channel Type User Guide, Tongass National Forest, Southeast Alaska (USDA Forest Service, 1992b) contains the most recent description of stream process groups and channel type. Based on channel-type definitions and other available data, the Project Team assigned an appropriate class to each stream and entered the data into the GIS stream data file. Stream class and channel type help establish prescribed riparian buffer widths (see the *Wetlands, Floodplains, and Riparian Areas* section).

The Project Team field-verified stream classes and channel types during harvest unit investigations. The Team identified all stream classes and channel types during site visits and noted this information on field unit cards for later transfer to the GIS. They then used this field data, along with aerial photos and maps, to modify the GIS stream layer. This update added considerable miles of stream to the GIS layer for the Control Lake Project Area. Table 3-7 presents stream miles based upon the updated GIS layer.

The 1997 TLMP Revision refined the stream classes from a three class system to a four class system. Forest Service resource specialists reviewed the mapped streams (many on the ground) and classed these as Class III or Class IV streams. The updated stream classifications incorporated results of more intensive field investigations that have occurred since the 1993 field investigations. It was found that most of the original Class III mapped streams are Class III streams under the new system.

Fish Habitat Capability

Maintaining or improving habitat capability to produce salmon is a primary management goal of the Forest Service. Although the Forest Service does not have jurisdiction over escapement, it is concerned about maintaining escapement of sufficiently high numbers of adult salmon spawners to seed the available habitat. Adult spawner escapements depend on numerous factors, such as commercial harvest rates and ocean survival, that are not influenced by changes in upland management.

Upland timber management potentially affects fish production. The Forest Service modeled fish production for the Project Area (USDA Forest Service, 1989b). The number of fish that a particular habitat potentially can produce is called habitat capability. Habitat capability for species harvested for subsistence, sport, and commercial purposes is very important since these species contribute to the livelihood and economic returns to the region. The fishing industry provides both jobs and income for Southeast Alaska (see the *Economic and Social Environment* section). Fishing, especially for salmon, also is a source of subsistence for residents of Prince of Wales Island. Additionally, salmon (particularly coho) and trout (particularly steelhead and cutthroat) are important to recreational anglers.

Several factors affect fish production or habitat capability within the stream environment. Logging practices can affect many of these important factors. A by-product of logging practices is increased vehicular access to fishing via logging roads. As a result, increased fishing pressure is placed on these stream and lake systems. Resident nonmigratory fish, such as cutthroat trout, could be affected by overfishing.

The following is a brief summary of the importance of some of the major environmental factors that can affect the production of fish within the systems. The discussion also presents general Forest Service guidelines to reduce effects of harvest activity.

Sedimentation

The concentration of sediment in the water column and the amount of fine sediment introduced into spawning gravel can affect aquatic productivity. Direct effects include clogging and damage to gill filaments and changes in fish behavior or habitat use (Marcus et al., 1990). Fine sediment introduced into stream gravels during incubation can entrap and kill salmonid embryos in the redd. Sediment deposition decreases redd permeability, which limits both the amount of water flow within the gravel and oxygen delivery to developing eggs and newly emerging fry (alevins) (Marcus et al., 1990; Everest et al., 1985), threatening their survival. Even if sediment deposition is not fatal to developing alevins, it can reduce their growth and fitness (Everest et al., 1985).

Regulations exist to eliminate or reduce the adverse effects of sediment-producing activity associated with logging. These include limiting road construction activities and use of equipment in Class I streams to those periods when eggs or alevins are not in the stream gravels. The windows for such activities generally occur before adult salmon enter streams to avoid disturbance during spawning. These windows can vary from stream to stream and site to site. Site-specific fisheries and field information (including ADF&G recommendations) help determine the operating windows. In the Ketchikan Administrative Area, the windows for allowed instream operations are from June 1 to August 7 for pink and chum salmon, June 15 to September 1 for coho salmon, and July 18 through August 15 for steelhead trout. Because of the variety of fish, their abundance, and timing by system, the exact dates of allowable construction may vary from those presented.

Indirect effects of fine sediment include embedding of gravels and filling of pools, both of which decrease the amount of available instream habitat for salmonids. Fine sediment fills cobble and gravel interstices, which serve as refugia for both juvenile and adult salmonids during the winter. The sediment accumulation might also reduce the volume of pools. Pools are important habitat for salmonids and other fishes during the winter. Lack of suitable winter habitat probably limits production of juvenile salmonids in many Alaskan streams (Marcus et al., 1990; Heifetz et al., 1986).

The effects of fine sediment on aquatic systems are highly variable and depend on the amount added, the amount already present, and the system's ability to store and transport sediment. A general review of studies on the effects of fine sediment on salmonid production (Everest et al., 1987) found that the assessments ranged from inconclusive to severe. In a similar review, Pella and Myren (1974) concluded that studies on streams near Hollis in southcentral Prince of Wales Island failed to reveal a meaningful relationship between clearcut logging to streambank and subsequent pink and chum salmon escapements. The studies were inconclusive, however, because of changes in salmon harvest rates, high natural variability in salmon escapements, and the short timeframe of the studies, among other factors.

The nutrient content of the water, type of debris, low pool-riffle ratio, and embeddedness of cobble/bedrock all limit fish productivity. Maintaining woody riparian vegetation is important as a source of nutrient input and as a source of debris to create pools and trap sediment in the stream.

Stream Temperature and Dissolved Oxygen

Seasonal changes in water temperatures and low levels of dissolved oxygen influence fish survival and condition. Water temperature affects the metabolic rate of aquatic organisms and can influence the migration timing of adult and juvenile fish. When temperatures go up, dissolved oxygen levels fall.

Small changes in water temperature can affect incubation and development of eggs in stream gravels as well as the emergence, feeding, and growth of fry and juvenile fish. Temperature change has a great effect on eventual adult survival (Holtby and Scrivener, 1989). Streamside forest or riparian vegetation provides overstory cover that maintains water temperature on small forested streams (Beschta and Platts, 1986). Harvest of riparian vegetation, as well as the total amount of harvest in a watershed, therefore, can affect water temperature.

Low winter temperatures can cause anchor ice to form and spawning gravels to freeze, which can reduce pool size. Removing streamside vegetation can aggravate low temperatures. However, estimating the effects of such cold-weather conditions is difficult because of the influences of intermittent snow or ice cover, high variability in winter air temperature, and the wind and precipitation patterns commonly found in Southeast Alaska. The implementation of TTRA and expanded-width buffers for riparian areas may moderate temperatures year-round (Marcus et al., 1990).

Dissolved oxygen levels in streams also affects survival of fish. Low concentrations that occur when fish abundance and water temperature are high can reduce fish survival. Stream systems that are particularly sensitive to high temperatures include slow-flowing streams with southerly aspects and streams with shallow lake and muskeg sources.

Fish kills, probably caused by high temperature or low dissolved oxygen, have occurred in and near the Project Area during periods with high air temperatures and low flows. The most recent was in September 1993 (USDA Forest Service, 1993b). Forest Service and ADF&G fish biologists assessed the extent and severity of fish kills across central and northern Prince of Wales Island using aerial observations (USDA Forest Service, 1993b). The surveys were not quantitative. Dead and dying fish were present in all of the drainages observed. The percentage of unspawned dead fish varied by drainage. The majority were pink salmon; there also was a fairly high number of chum salmon. When dead fish were observed, they occurred in very large numbers and very high densities.

Precipitation and streamflow were extremely low in this area in 1993, greatly reducing total fish-holding habitat and probably increasing average stream temperature (USDA Forest Service, 1993a). Lethal water-temperature limits for both adult and salmon fry is 75.2°F; ideal temperatures generally are between 50°F and 64.4°F. None of the water temperatures were high enough to be considered lethal by themselves. The highest temperature recorded during the survey was on Staney Creek (60.8°F) (USDA Forest Service, 1993a, 1993b). However elevated water temperatures contribute to the problem since warmer water holds less oxygen than cooler water. Extensive timber harvest practices affect flow regimes and stream temperatures by altering hydrologic and riparian conditions. However, the extent to which previous logging activity contribute to fish kills is not known.

Below is a brief summary of fish kills and habitat conditions observed during the September 1993 aerial survey (USDA Forest Service, 1993b.)

Thorne River—Large concentrations of fish (estimated 300) were observed in the lower Thorne River from the estuary to Goose Creek. Mostly live and few dead fish were observed from

Goose Creek up to 8.5-mile hole. The riparian zone of the lower Thorne River consists of a mixture of old- and second-growth forest. Upstream riparian areas (including tributaries) have been heavily to moderately harvested.

Steelhead Creek—Thousands of dead fish were observed in lower Steelhead Creek from the estuary to above the 20 Road. Thousands of live fish were also present in the system. Most of the riparian area was harvested 10 to 12 years ago. Approximately 1,000 feet of old growth extends from the harvested reach to just below a barrier falls. There are moderate levels of harvest in and around the riparian area above the falls. Fish mortality extended to near the base of the barrier falls.

Election Creek—Several hundred dead fish were observed in the lower reaches of Election Creek on private land, but mortality appeared to be fairly low in the middle and upper reaches of Election Creek on National Forest System land. Moderate to high concentrations of live fish were observed in the lower, middle, and upper reaches. Most of the riparian area of lower Election Creek was harvested approximately 10 years ago. There has been little riparian harvest in the middle and upper reaches which are mostly well buffered.

Nossuk Creek—Several thousand dead salmon were distributed evenly from the lower to upper reaches of Nossuk Creek. A substantial number of fish were still in the estuary waiting to enter the stream. Observers could not determine the species composition of these fish. From ground observation in the upper reach of Nossuk Creek, an estimated 70 percent of the dead fish, many of which were chum salmon, had completed spawning. This reach had many successfully spawning pink salmon. The majority of the Nossuk Creek riparian area is old growth.

Staney Creek—Though most of the Staney Creek watershed is not in the Project Area, it is in close proximity. Thousands of dead fish were observed in the upper reaches of the middle fork of the creek above the confluence of the middle and south forks. The greatest concentration of dead fish (90 percent of all fish in the reach) were observed in the reach extending from the confluence of the middle and south forks down to the 2050 bridge crossing. The Forest Service examined a representative reach with extremely high mortality. The reach was mostly a nearly dewatered riffle. In one 50-foot length of stream, 586 dead salmon were counted. An estimated 90 percent of the salmon had not spawned. Dead sculpins and Dolly Varden were also present. The temperature was approximately 60.8°F. Although the total number of dead fish was high, the proportion of dead to live fish was lower, about 75 percent from the 2050 bridge to the estuary. The majority of the Staney Creek riparian area was logged approximately 20 to 25 years ago. The ground observations were made in an area logged during this period.

The specific cause of the fish kills described above is unknown. Fish kills in other parts of Southeast Alaska have been linked to overcrowding of spawning fish in high escapement years resulting in de-oxygenation of water from fish respiration. Such events are unpredictable and have not been directly linked to timber harvest. Research has been conducted on the potential causes of these fish kills (Pentec Environmental, Inc., 1991). The research was designed to address the physical instream reasons for adult fish kills. No actual fish kills were observed during this phase of the research (Pentec Environmental, Inc., 1991).

Large Woody Debris

Large woody debris (LWD) are trees and tree pieces greater than 4 inches in diameter and 6 feet long (Keller and Swanson, 1979; Bilby and Ward, 1989). LWD are critical to high-quality fish habitat (Marcus et al., 1990). Also known as large organic debris (LOD), this material provides food and building materials for many aquatic life forms, offers cover for juvenile and adult fish, and is the primary channel-forming element in some channel types (Marcus et al., 1990). If trees are harvested to the stream bank, it can take as long as 90 to 150 years for new trees to grow to the size needed for effective LWD input into the stream. Prior to the enactment of TTRA, timber often was harvested to the edge of the streams. Stream-cleaning operations were commonly conducted to prevent fish passage problems. TTRA and its expanded-width buffers offer a source of LWD. Class III stream buffers also provide a continual source of LWD both onsite and downstream throughout fish producing watersheds.

LWD affects many aspects of streams, including channel morphology,.sediment storage, water retention, stream nutrient cycling, macroinvertebrate productivity, and fish habitat (Marcus et al., 1990; Lisle, 1986; Swanson et al., 1984). As debris accumulates in streams, it creates pools that provide important habitat for rearing salmonids, traps nutrient-laden organic matter, and supports aquatic insects and other food items for fish (Heifetz et al., 1986; Murphy et al., 1986). LWD accumulations contribute to bankfull width and stream edge; edge habitat is important for salmonid survival at high flows (Robison and Beschta, 1990). Coho salmon and Dolly Varden char prefer habitat cover provided by LWD and pools formed by LWD, particularly during juvenile rearing. Stable LWD accumulations in first- and second-order tributary streams store large amounts of sediment (Keller and Swanson, 1979; Heede, 1985; Swanson and Lienkaemper, 1978), buffering sediment transport to downstream pink salmon spawning areas (pink salmon are limited by quality of spawning gravels and not rearing habitat) (TLMP, 1997).

LWD often changes the morphology of streams, creating a longitudinal stair-stepped pattern (Heede, 1985). Individual steps that are too high can block upstream fish passage, particularly at lower flows. These blockages are rarely total, however, and are relatively easy to breach or physically remove (Bryant, 1983). At higher flows, fish often can jump over what appear to be complete barriers at lower flows.

Large accumulations of logging slash in streams can also block fish passage. Logging slash may include larger branches and short sections of boles without rootwads. Much of this type of LWD is floatable and, therefore, unstable (Bryant, 1980). Unstable accumulations of LWD can wash out and destabilize streambanks, potentially reducing fish habitat and overall stream productivity.

Blowdown of trees is a natural phenomenon in Southeast Alaska. Evidence indicates that blowdown does not occur randomly though it is widely distributed across the landscape. Natural factors and the shape of created openings determine the probability of blowdown in adjacent stands (Harris, 1989; Moore, 1977). The TLMP Revision (1997) standards and guidelines direct that blowdown potential be considered when designing harvest units. Some blowdown can contribute to the LWD needed to maintain instream habitat.

Fish Enhancement Projects

Major habitat improvements, including a fish passage facility, habitat structure placement, and riparian enhancement, have been made to a few streams in the Project Area. Table 3-8 shows the location of existing and planned Forest Service stream enhancement projects and the years they were implemented or scheduled for development. These improvements include a fish passage facility in Rio Roberts (Watershed C49B.2200) and habitat structures in Control Lake (Watershed C49B.2400). The Rio Roberts fish pass project is expected to produce the single greatest increase in fish production potential.

Management Indicator Species

An analysis of the effects of environmental action on every plant and animal species in the Project Area would be costly and time-consuming. Consequently, Forest Service EIS projects traditionally select certain species that are believed to generally characterize the existing conditions and indicate the effects of environmental activities for all species. These are known as MIS. For this EIS, coho and pink salmon are the MIS for anadromous fish species and represent two different phases of salmon life history: spawning/egg incubation and freshwater rearing. Dolly Varden char represents resident species for the Control Lake Project Area. Details of the habitat capability models for coho and pink salmon and Dolly Varden char can be found in the Draft EIS or the Supplemental Draft EIS.

MANAGEMENT INDICATOR SPECIES (MIS)

Coho Salmon

Pink Salmon

Dolly Varden Char

Table 3-8
Existing and Planned Stream Enhancement Projects in the Control Lake Project Area

Name	VCU	ADF&G Stream No.	Project Type	Year Planned (P), Implemented (I), or Deferred (D)
Rio Roberts	596,576,575	102-70-58	Fishpass	1988(I)
			Bioenhancement	1988-1991 (I)
Rio Beaver Creek	597	102-70-58	LWD monitoring	1944 (P)
			Basinwide rehab.	1944 (P)
			Slide seedings	1989,1992,1993 (I)
North Thorne River	578	102-70-58	LWD rehabilitation	1993 (P)
Steelhead Creek	595	103-60-29	Planting conifers	1991 (I)
			LWD rehabilitation	1993 (P)
			Fishpass	1997 (P/D)
Logjam Creek	577	106-30-53	LWD rehabilitation	1996, 1997, 1998 (P)
Big Salt Lake			Chinook smolt released	1988, 1991 (I)
Control Lake	596	102-70-58	LWD rehabilitation	1991 (I)
Black Bear Lake	595	103-60-31	Bioenhancement	1956 (I)

Source: Personal communication with the Thorne Bay Ranger District Forest Service and ADF&G FRED Division Management Indicator Species

Marine Resources

Southeast Alaska's coastline consists of approximately 30,000 miles of tidal shoreline, roughly 60 percent of the total Alaskan coast. This region contains highly diverse habitats that collectively account for the complex estuary and tidal environments of Southeast Alaska. The marine environment of the Project Area encompasses a wide variety of ecosystems. The shallow marine waters and associated mud flats and estuaries found in the protected coves and bays provide habitat for some important species such as Dungeness crab and juvenile salmon. They are part of a complex and dynamic ecosystem that includes shrimp, flatfish, marine worms, echinoderms, sponges, sea anemones, shellfish, plankton, marine algae, and other organisms. Marine resources along the Big Salt Lake and Elevenmile shorelines are used extensively by local residents.

Major Watersheds and Anadromous Fish Streams

Watersheds are areas that contribute water to a drainage or stream. They are portions of the landscape in which all surface water drains to a common point. Generally, major watersheds in the Project Area (Figure 3-3) contribute the most to fish production; all of these contain anadromous fish stocks and are characterized by more stable flow regimes and greater amounts of habitat than smaller drainages. The general distribution of anadromous fish in relationship to watersheds is described below.

The lower reaches of larger streams in the Project Area, including reaches within the intertidal zone, contain the bulk of spawning habitat for pink and chum salmon. These species typically do not rear in fresh water; fry emigrate to salt water shortly after emergence. Barriers or breaks in stream gradient that pose little or no problem for other salmonids often impede the upstream migration of pink and chum salmon. In contrast, coho salmon and steelhead ascend such barriers with ease and often are distributed much higher in the drainage basins. Coho salmon may occupy small streams with relatively high gradients. Typically, drainages in the Project Area with numerous braided side channels and large amounts of instream LWD contain the most rearing habitat for juvenile coho salmon.

The following streams and lakes contain most of the Project Area steelhead (the anadromous form of rainbow trout): Log Jam Creek (Watershed C21C), Hatchery Creek (C20D), Thorne River (WC49B/C45D), Balls Lake (C49B.2000), Control Lake (C49B.2000), Angel Lake (C49B.1000), Snakey Lakes (C49B.2700), Cutthroat Lake (C49B.2000), Shinaku Creek (DO38), Steelhead Creek (C95B), Black Bear Creek (C93A), and Nossuk Creek (D12A.0100).

Sockeye salmon are found mainly in drainages containing lakes. The following streams in the Project Area contain sockeye: Log Jam Creek (Watershed C21C), Hatchery Creek (C20D), Thorne River including North Thorne River (C49B/C45D), Balls Lake (C49B.2000), Control Lake (C49B.2000), Angel Lake (C49B.1000), Snakey Lakes (C49B.2700), Lake Galea (C20D), Cutthroat Lake (C49B.2000), Blackbear Creek (C93A), and Black Lake (C93A).

Both cutthroat and Dolly Varden char may be present either as anadromous forms or as resident fish in lakes and reaches of streams not generally used by anadromous species. Resident rainbow trout have been introduced into at least one lake drainage (Black Bear Lake). Although there are no known chinook (king) salmon streams in the Project Area, they do occur in adjacent marine waters.

Appendix D in the Draft EIS contains a more detailed summary by major watershed of available information for anadromous fish streams (identified by ADF&G stream number) and lakes in the Project Area.

Aerial view of Angel Lake looking northwest

Vegetation and Timber Resources

Key Terms

Advanced Regeneration—Natural conifer reproduction established beneath an existing forest canopy; comprised of trees ranging from 5 to 20 feet in height.

Allowable Sale Quantity (ASQ)—The maximum quantity of timber that may be sold in each decade from suitable scheduled lands covered by the Forest Plan.

Basal Area (BA)—The area of the cross section of a tree stem, or group of trees, measured at 4.5 feet above ground; usually presented as total square feet per acre.

Blind Lead—An area within a harvest unit that is difficult to yard (removed felled timber) with conventional cable logging systems on convex slopes.

Board Foot (BF)—Lumber or timber measurement term. The amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide.

Climax Plant Community—The final or stable biotic community in a successional series which is self-perpetuating and in dynamic equilibrium with the physical habitat; the assumed end point in succession.

Commercial Forest Land (CFL)—Land that is capable of producing continuous crops of timber (20 cubic feet per acre of tree growth annually, or at least 8 MBF/acre).

Ecosystem—all of the organisms in a given area interacting with the physical environment so that the flow of energy leads to an exchange of materials between living and nonliving parts within the system.

Even-aged Management—The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. The age difference between trees in the canopy level usually does not exceed 20 percent. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

Falldown—The difference between planned or scheduled harvest and that which is attained after implementation.

Forest Land—Land at least 10 percent occupied by forest trees of any size, or formerly having had such tree cover and not currently developed for nonforest use.

MBF—Thousand board feet.

MMBF—Million board feet.

Partial Cutting—Removal of selected trees within a forest stand in any variety of spatial patterns. This may include thinning, selective cutting, shelterwood or an overstory removal.

Plant Association—A basic unit of vegetation classification based on land management potential, species composition, successional patterns, and the climax plant community.

Precommercial Thinning—The practice of removing some of the trees less than merchantable size from a stand to improve tree growing space and promote rapid growth. Trees will grow faster due to reduced competition for nutrients, water, and sunlight.

Reserve Trees—Merchantable or submerchantable trees and snags that are left within the harvest unit to provide biological habitat components over the next management cycle.

Shade Tolerance—Tree species that have physiological growth processes adapted to shaded environments. Western hemlock is a shade tolerant species. Other tree species tolerance to shade may range from tolerant to intolerant.

Silvical Characteristics—Physiological and genetic characteristics of individual tree species and the ecological characteristics (biological and environmental factors) of the site which enable a specific species to be adapted to a particular and unique site.

Silvicultural Practices—Management techniques used to modify, manage and replace a forest over time. Silvicultural practices are classified according to the method of carrying out the process (shelterwood, seed tree, clearcut, commercial thinning, etc.).

Silviculture—The art, science and practice of controlling the establishment, composition, structure and growth of trees and other vegetation in forest stands.
Site Index—A measure of a forest areas relative productive capacity for tree growth. Measurement of site index is based on height of dominant trees in a stand at a given age.
Succession—A series of dynamic changes by which one group of organisms succeeds another through stages leading to a potential natural community or climax. The process of plant community development after disturbance involves changes in species composition over time.
Suitable Forest Land—Commercial forest land identified as having the biological capability to sustain long-term timber production, that has not been withdrawn from timber production.
Uneven-Aged Management—The application of management techniques which will maintain high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes. Cutting methods that develop and maintain uneven-aged stands are single-tree and group selection.
Volume Class—Classification system used to differentiate timber stands into similar average volume per acre categories or strata.

Introduction

The Control Lake Project Area encompasses 201,371 acres. This area consists of 179,231 acres of Forest System lands (including 8,159 encumbered acres) and 22,140 acres of state and private lands.

The landscape of central Prince of Wales Island is characterized by intermixed stands of productive hemlock/spruce forest, nonproductive forest stands, and nonforested areas. The spatial distribution of these stands can be traced back to the glacial and climatic history of the area which combined to shape soil development.

Soil drainage is the most influential factor on Prince of Wales Island determining the type and amount of vegetation that grows. Poorly drained soils, such as those overlaying compact glacial till, result in the development of nonforested muskeg sites or unproductive forest stands. Well-drained soils, such as those overlying limestone, result in highly productive forest stands.

Land Use Designations and Desired Condition

The Revised Forest Plan (USDA Forest Service 1997) describes the desired condition for each LUD. The Control Lake Project Area contains a variety of LUDs. Timber harvest will occur primarily in three LUDs within the Project Area.

In areas determined to be suitable forest land within the Timber Production LUD, natural ecological processes will be replaced by timber management practices. The landscape will have a highly modified appearance, dominated by timber harvest and road building activities. These areas will contain timber harvest units of varying sizes and ages among areas of old growth and nonforest vegetation.

The Scenic Viewshed and Modified Landscape LUDs will also yield timber, but with more restrictions. The future appearance of these areas is expected to show a mosaic of timber harvest units of varying sizes and ages of origin interspersed with areas of old growth and nonforest vegetation. The landscape, as viewed by most forest visitors, will have a modified but still basically “natural” appearance.

Ecosystem Management

Under ecosystem management, new silvicultural strategies are examined, and older strategies re-evaluated, to bring about a different balance in resource production in managed forests. The basic philosophy of this concept is to mimic natural processes, and to maintain options for future management while more knowledge becomes available about the impacts of forest management activities on the ecosystem.

Forest Land Classification

National Forest System lands are defined by vegetative cover, soil type, and administratively designated land use. This classification scheme is intended to show the amount of land that is covered by forested vegetation with further divisions to show the amount of that land that is capable of timber production.

Non-Forest Land

Nonforest land is defined as National Forest System land that is biologically unable to support at least a 10 percent cover of forest trees. This land includes muskegs, rock outcrops, talus slopes, alpine vegetation, and river systems among others. This area was classified through timber type map GIS coverages. About 6 percent of the non-encumbered National Forest System land in the project area or 10,840 acres are classified as nonforest land.

Forest Land

Forest land refers to National Forest System land that has at least 10 percent tree cover of any size, or formally had such tree cover and is not currently developed for nonforest use. This area was classified through timber type map GIS coverages. About 94 percent of the non-encumbered National Forest System land in the Project Area or 158,582 acres are considered forest land.

Commercial Forest Land

Commercial forest land is land that is biologically capable of producing continuous crops of timber. The Forest Service has defined commercial forest land as land that is capable of producing at least 20 cubic feet of annual tree growth per acre or contains at least 8 MBF of net timber volume per acre (USDA Forest Service, 1978). Second-growth stands that have experienced regenerative success after disturbance qualify as commercial forest land. The Control Lake Project Area contains 86,628 acres of commercial forest land in the non-encumbered National Forest System land base.

Noncommercial Forest Land

Noncommercial forest land is land that does not support enough timber volume or is not productive enough to meet the criteria for commercial forest land. About 71,954 acres of the non-encumbered National Forest System land base in the Project Area is considered noncommercial forest land.

Suitable Forest land

Forest land is further classified as tentatively suitable and suitable for timber harvest. This classification scheme is intended to show the amount of land within the Project Area that is removed from timber production for various reasons.

Under the TLMP Revision (1997), tentatively suitable forest lands are those lands that meet the following four criteria: (1) the land is forest land as defined under the NFMA; (2) technology is available to ensure timber production from the land without irreversible resource damage to soils productivity, or watershed conditions; (3) there is reasonable assurance that the land can be adequately restocked as provided under NFMA; and (4) the land has not been withdrawn from timber production by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service (e.g., Wilderness Areas, Research Natural Areas). Suitable forest lands include the portion of tentatively suitable lands that are appropriate for timber production based on the

Forest Plan LUDs and standards and guidelines. The LUDs that preclude timber production under the 1997 TLMP Revision include: Old-growth Habitat, Semi-remote Recreation, proposed Research Natural Areas, and others. Several forest-wide standards and guidelines also preclude timber production under the 1997 TLMP Revision. These include the following standards and guidelines: Beach and Estuary Fringe, Riparian, Karst and Cave, and others.

The suitable forest land base for the Control Lake Project Area under the new Forest Plan is approximately 26,545 acres. About 22,786 acres of this is old growth and 3,759 acres is second-growth forest.

Previous Harvest

The earliest commercial timber harvest on central Prince of Wales Island occurred during the early 1940s. This coincides with the increased need for high quality spruce used in airplane construction prior to World War II. The amount of logging at this time was very limited and restricted to easily accessible coastal shorelines as there were no roads in the area. Development of the logging road system on central Prince of Wales Island began in earnest in the mid-1960s. This marked the beginning of intensive land-based logging efforts which continue today. Table 3-9 shows the total area that has been previously harvested since 1940, only 6,844 acres of this total is currently within the suitable timber base.

Table 3-9
Past Timber Harvest Acreage: Control Lake Project Area

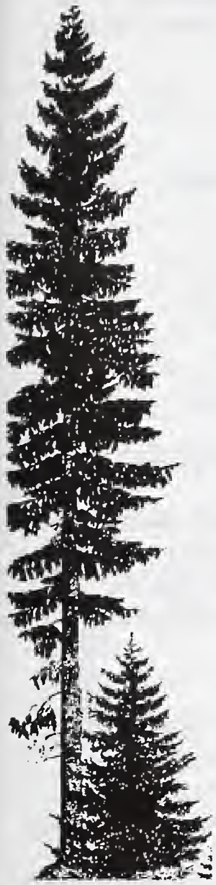
Harvest Period	Acres Harvested[1/]
1940 to 1949	20
1950 to 1959	40
1960 to 1964	30
1965 to 1969	2,337
1970 to 1974	25
1975 to 1979	187
1980 to 1984	244
1985 to 1989	3,115
1990 to 1994	4,605
Total	10,603

Source: USDA Forest Service, Ketchikan Area GIS Database.
1/ Includes previous harvest acres on lands currently defined as not suitable for timber harvest, such as congressionally designated TTRA stream buffers.

Silvical Characteristics of Tree Species

Silvical characteristics are the physiological (genetic) characteristics of the individual tree species and ecological characteristics (physical and biological requirements) that combine to produce the tree that exists on any particular (unique) site. The general silvical characteristics of the tree species within the Control Lake Project Area are described in the Draft and Supplemental Draft EIS.

Plant Communities and Cover Types



Sitka spruce

Forest Plant Communities

The Control Lake Project Area is a mosaic of coniferous forest interspersed with muskeg, shrubland, alpine vegetation, and beach fringe plant communities. Forest vegetation has been categorized using the Tongass Forest Plant Association Management Guide (De Meo 1992), which describes potential vegetative climax communities that may develop over time in response to soil, climate, plant geography, and evolution. This classification system assists land managers and resource specialists to predict the outcome of various vegetative manipulations. Based upon GIS information and field observations, the forested portion of the Project Area exhibits six plant series. These include the Western Hemlock, Sitka Spruce, Mixed Conifer, Mountain Hemlock, Western Hemlock-Western Red Cedar, and Lodgepole Pine Series. More detail on these series is available in the Draft or Supplemental Draft EIS.

Nonforested Cover Types

Nonforested habitats in the Control Lake Project Area include muskeg vegetation, alpine vegetation (including grassland and rock), shrubland (including landslide areas), and estuary habitat. More detail on these nonforested habitats can be found in the Draft or Supplemental Draft EIS.

Threatened and Endangered Plant Species

Threatened, endangered, and sensitive plant species are discussed in the *Threatened, Endangered, and Sensitive Species* section.

Timber Classifications

The 1997 TLMP has adopted a three-class system that can be used for estimating volumes. The new system provides better correlations for determining old-growth habitats and has been used for wildlife analysis in the Plan and subsequently in this EIS. The three classes of productive old growth are:

High Volume Strata: Areas within timber inventory volume classes 5, 6, and 7 on non-hydric soils, and on hydric soils with slopes greater than 55 percent.

Medium Volume Strata: Areas within timber inventory volume classes 5, 6, and 7 on hydric soils with slopes less than or equal to 55 percent; and areas within timber inventory volume class 4 that are either on non-hydric soils, or are on hydric soils with slopes greater than 55 percent.

Low Volume Strata: Areas within timber inventory volume class 4 on hydric soils with slopes less than or equal to 55 percent.

Site Class

Site class is a measure of the relative productive capacity of a parcel of land for tree growth. This measure is used to predict future timber yields. Site class is directly related to soil type and topographic position. The relationship between tree height and age is used as a measure of site index (SI).

Volume Estimates

The total inventory volume for the Control Lake project is estimated from units inventoried during summer 1993. Estimates derived from the 1993 project inventory are shown in Table 3-10. (Note that because this inventory was conducted in 1993, the data are presented in terms of the original four-class system for classifying volume). More specific information on the inventory process and statistical results can be found in the Control Lake Timber and Vegetation Resource Report (Boyce and Goering, 1995).

Harvest unit and alternative volume estimates have been updated from the Supplemental Draft EIS to reflect additional field investigations since the 1993 field season, and to reflect incorporation of the new standards and guidelines of the new Forest Plan (1997).

Table 3-10
Inventory Volume[1/], Tree Density, and Basal Area per Acre by Volume Class

	VC4	VC5	VC6	VC7
Volume (BF/Acre)[2/]	21,472	29,200	32,561	33,795
Trees/Acre	131	111	104	116
Basal Area/Acre	203	222	225	233

1/ Note that because the inventory was conducted in 1993, data are presented in terms of the original 4-class system for volume.
2/ Includes a 17 percent hidden defect, breakage, and utility deduction.

Forest Health

A healthy forest can be defined as the renewal and continuation of the forest with minimal repression from biological and physical agents. Various living and nonliving agents, including fires, insects, disease, and animals, alter the natural aging and death process of trees and stands. Additional discussion on forest health can be found in the Supplemental Draft EIS.

Mountain hemlock

Windthrow

High winds historically have blown down patches of trees and individual trees throughout the Project Area during winter storms. The prevailing winds are associated with southeast gales (Harris, 1989). Recently, storms in the fall and winter of 1968 and 1978 produced patches of blown down trees in the western portion of the Project Area. This appears to be nature's way of reproducing forests in this area since extensive wildfires are precluded by the moist, maritime climate. All commercial species are shallow-rooted and susceptible to windthrow. Overall, the most damage occurs in the high-valued, dense stands of spruce and western hemlock exposed to the ocean winds.

Characteristics of Windfirm trees:

1) Open grown trees which have been exposed to storm winds throughout their life.
2) Dominant trees with crowns well above the average stand height.
3) Low form class, high stem taper, and are short.
4) Have prop roots, especially on the leeward side.
5) Straight trees, with well-formed stem and no lean.
6) No stem or root decay and no stem swelling.
7) Deep rooted on well-drained sites.
8) Western red cedar, Alaska yellowcedar, and immature alder species.

Silviculture

The practice of silviculture takes into account the interaction of soils, climate, and tree physiology in determining how a stand of trees can be harvested, reproduced, and tended to achieve the desired future condition of the stand. Silvicultural practices are directed at creating and maintaining the type of forest that will best fulfill the objectives of the land manager.

Silvicultural practices by the Tongass National Forest on Prince of Wales Island primarily center around the management of four tree species: western hemlock, Sitka spruce, western red cedar, and Alaska yellowcedar. The silvical characteristics of each species results in the development of different management approaches for a site based on the existing stand condition and the desired future condition.

Appendix G of the 1997 TLMP Revision Final EIS discusses silvicultural systems and criteria for selection of the various systems in detail. Appendix G is incorporated by reference.

For the Control Lake project three categories are used to display silvicultural harvest systems. These are clearcut with reserves, non-clearcut regeneration, and uneven-age management. The clearcut with reserves are comparable with Type A and B clearcuts used in the Supplemental Draft EIS. The non-clearcut regeneration would be comparable with Types C, D, E, F and G in the Supplemental Draft EIS. The non-clearcut regeneration systems would yield two-age silvicultural systems as discussed in Appendix G. The uneven-age management would include Types H and I used in the Supplemental Draft EIS.

Timber Harvest Methods

Western hemlock

Ground-based Yarding Systems

Ground-based systems include tractor and shovel yarding. Tractor yarding, referred to as skidding, includes the full range of surface skidding equipment. Ground-based systems are generally confined to downhill logging on gentle slopes.

Shovel yarding is the process of moving logs from the stump to the landing by repeated swinging with a hydraulic loader. The loader is walked off the haul road and into the harvest unit. Logs are decked progressively closer to the haul road with each pass of the loader until they are finally decked at roadside. For this system to be used effectively, soils should be well drained and side slopes should be less than 20 percent.

Cable Yarding Systems

Cable yarding systems proposed for the Control Lake Project Area include highlead (Figure 3-19), slackline (Figure 3-20), and live and running skyline (Figures 3-21 and 3-22) systems. Highlead and slackline systems can be used to yard logs both uphill and downhill. Skyline systems are used for uphill logging only. Logs yarded by highlead systems are generally dragged on the ground. Some lift to one end of the log is provided by the height of the towers (90-foot towers are commonly used). Where downhill highlead yarding is used, the drag corridors radiate down and toward the landing. There is greater ground disturbance using downhill highlead yarding and water tends to congregate as dredge corridors converge at the landings. Slackline and skyline systems are able to lift one end of the logs or completely suspend the logs, depending on the unit configuration. The impact of yarding on the soil is much reduced using these systems when compared with highlead yarding.

Helicopter Yarding Systems

Helicopter yarding is a system by which logs are moved from the stump to the landing with a helicopter. Total suspension of the logs is achieved resulting in the least impact to the soil. Helicopter yarding is also more expensive than yarding with cable or ground-based systems.

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Wildlife

Key Terms

Carrying capacity—the maximum number of a wildlife species that can be supported in a given area or habitat through the most critical period of the year.
Ecological province—biogeographic areas characterized by similar patterns of species composition, similar distributional patterns of organisms, and a similar geomorphological history.
Habitat—the sum total of environmental conditions of a specific place that is occupied by an organism, population, or community of plants or animals.
Habitat capability—an estimated number of individuals of a species that a habitat can sustain.
Game Management Unit—an Alaska Department of Fish and Game (ADF&G) land division used to regulate the harvest of wildlife species.
Management Indicator Species (MIS)—vertebrate species whose population changes are believed to best serve as an index of a biological community's response to the effects of land management activities or which are important to hunters and trappers.
Viable population—the number of individuals of a species required to ensure the continued long-term existence of the population in natural, self-sustaining populations well distributed throughout their range in the National Forest.
Value Comparison Unit (VCU)—land management units which generally encompass a drainage basin to provide a common set of areas where resource inventories can be conducted and resource interpretations made.
Wildlife Analysis Area (WAA)—division of land identified by the ADF&G and used by the Forest Service for wildlife analysis.

Introduction

The Control Lake Project Area is a mosaic of muskegs, wetlands, alpine meadows, and forest. Before the onset of forest management in the 1950s, forested areas were almost exclusively old growth. Timber harvest has occurred in areas of relatively easy access, such as on the gentler slopes at lower elevations. Traditional timber harvest practices, primarily clearcutting, have resulted in the replacement of multi-storied, old-growth forest stands with young regenerating stands that are structurally and compositionally simpler than the older stands.

The response of wildlife communities to forest succession following timber harvest is complex. Each plant and animal species reacts differently to harvest, with some species benefitting, while others are detrimentally affected. Wildlife species that derive benefits during the early clearcut stage of succession (5 to 25 years) because of an increase in forb and shrub production include black bear, long-tailed vole, and a number of migratory breeding bird species that nest and/or feed in understory vegetation. Species dependent on large, contiguous tracts of old-growth forest, such as marten, Prince of Wales flying squirrel, and Queen Charlotte goshawk, find habitat quantity and quality reduced, as past and future harvests diminish the extent of suitable habitat and the number of travel corridors connecting remaining tracts.

Wildlife Habitats

Habitat refers to the type of environment in which a species occurs. It can be described in terms of elevation, topographic position, or type of vegetation community. A species may occupy a range of different habitats, or more than one distinctive kind of habitat in different seasons. Habitats that occur within the Control Lake Project Area include old-growth forest, second-growth forest, alpine/subalpine, wetland, beach fringe, estuary, and riparian. Many of these habitat types overlap; for example, beach and estuary fringe may include old growth, second-growth forest, and wetland habitats.

The Control Lake Supplemental Draft EIS presented three analyses to facilitate discussion of wildlife habitats. First, it described all Project Area forested lands by forest successional stages. Nonforested acres are described as a single category. Next, it presented the nonforested habitats and special wildlife habitats such as riparian and beach fringe. Finally, it provided an analysis of the old-growth forest successional stage. This analysis used plant series and timber volume class information, and addresses the components of patch size and travel corridors. Refer to the Supplemental Draft EIS for these discussions.

Table 3-11 presents the WAAs and VCUs within the Project Area. The distribution of WAAs in and around the Project Area is shown in Figure 3-9.

Table 3-11
Project Area WAAs and VCUs

WAA Number	Acreage of WAA in Project Area	Percent of WAA in Project Area	VCUs in WAA
1318	30,800	51	594, 595
1319	76,984	74	575, 576, 578, 596, 597.1, 597.2
1323	34,497	92	591, 592, 593
1421	29,630	33	574, 577

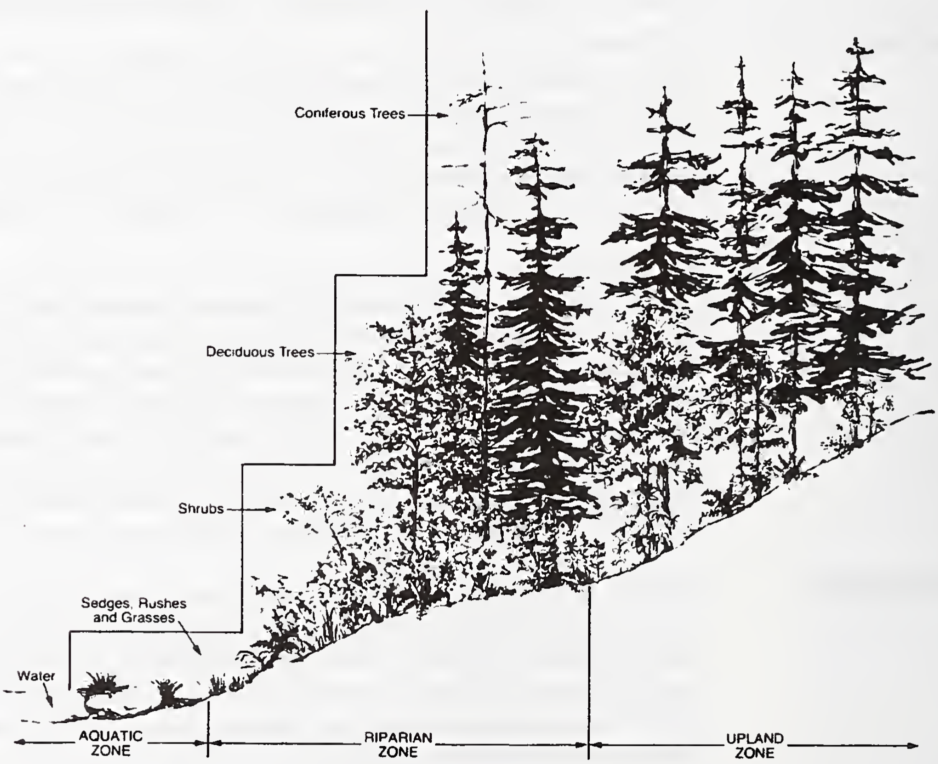
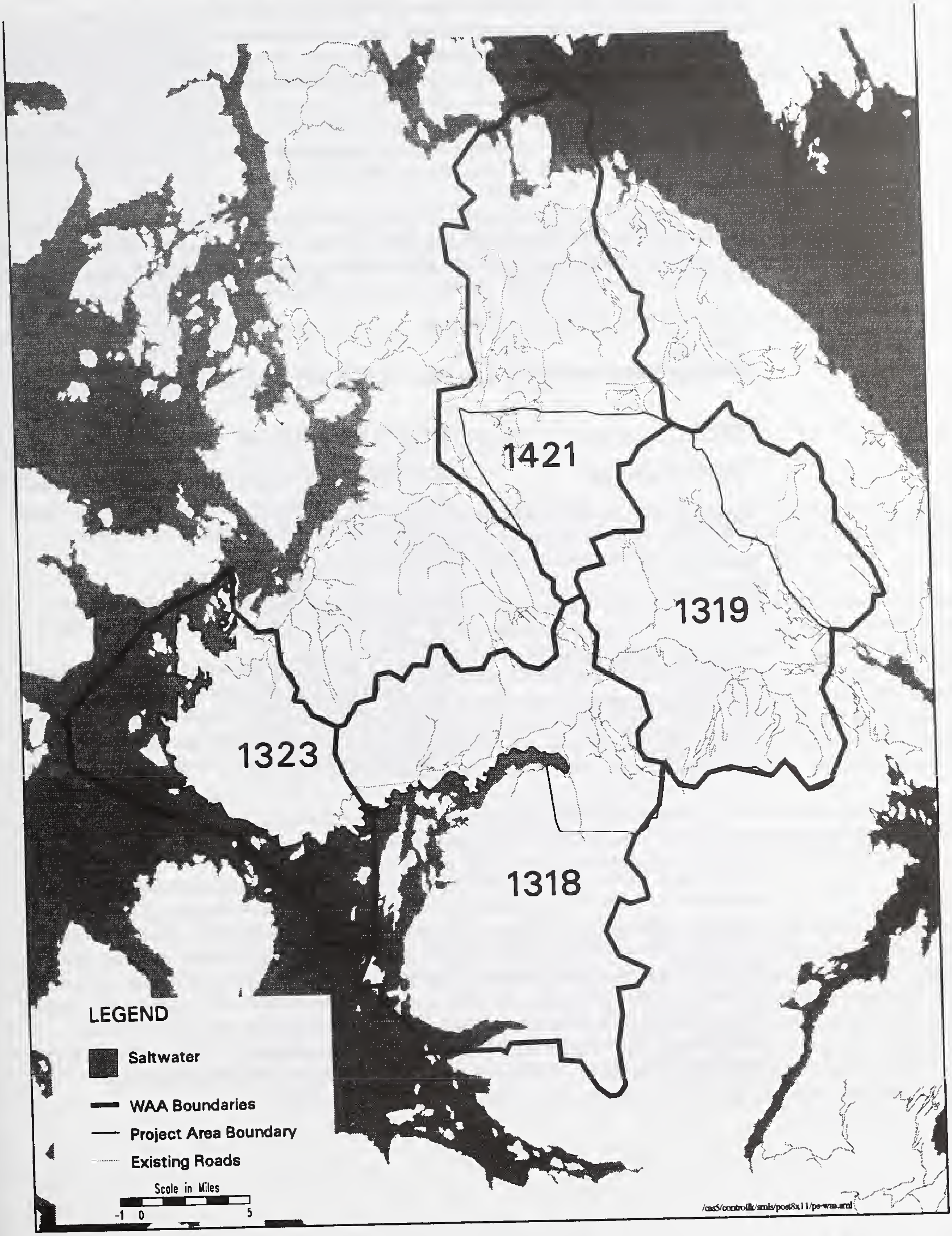


Figure 3-9
Distribution of WAAs In and Around the Project Area



Management Indicator Species

Management indicator species (MIS) are vertebrate or invertebrate species whose response to land management activities can be used to predict the likely response of other species with similar habitat requirements. Through the MIS concept, the total number of species that occur within a planning area is reduced to a manageable set of species that collectively represent the complex of habitats, species, and associated management concerns. MIS are also used to help establish management goals for species in public demand. The National Forest Management Act regulations prescribe the use of management indicator species. However, the concept of MIS should be viewed with caution. Limitations in the concept of MIS have been identified (Landres et al. 1988); most notably the concept that the habitat relationships of one species can reasonably represent those of another species, a precept that is inconsistent with the concept of ecological niches to which each species has individually adapted.

For the Tongass Forest Plan Revision, 13 management indicator species have been identified. The Control Lake project does not include the brown bear, mountain goat, or red squirrel as MIS, since they do not occur on Prince of Wales Island. Table 3-12 presents the species that will serve as MIS for this project. Species-by-species information is briefly summarized below.

Table 3-12
Management Indicator Species for the Project Area

Species	Rationale for the Selection
Sitka black-tailed deer	Represents species using low elevation old-growth forest habitats during the winter; important game species
Black bear	Represents species using estuarine habitat; game species
Wolf	Predator tied to a specific prey base
River otter	Represents species using riparian habitat; furbearer
Marten	Low elevation old-growth winter habitat; important furbearer
Vancouver Canada goose	Represents species using riparian habitat; game species
Bald eagle	Old-growth coastline; high public interest
Red-breasted sapsucker	Cavity excavator using low-volume old growth
Hairy woodpecker	Cavity excavator using high-volume old growth
Brown creeper	Represents species using large, high-volume old-growth

Source: USDA Forest Service 1982

Until recently, habitat capability models (Suring 1993) were used to estimate existing and future habitat for each MIS. These models were used primarily as relative measures of the effects of Forest Plan alternatives on habitat by indicating relative habitat capability. Few of the models had received field review or testing. Model "outputs" were often expressed in species population numbers, giving the misleading impression that actual numbers of individuals were being indicated. Population numbers for many species can vary widely from year to year as a result of many factors other than habitat capability. The models were never intended to represent population models that consider fecundity, mortality, population age structure, etc. and often incorporate an element of 'random' environmental events that can affect populations.

MANAGEMENT INDICATOR SPECIES (MIS)—Wildlife
Black bear
Marten
River otter
Gray wolf
Sitka black-tailed dDeer
Vancouver Canada goose
Bald eagle
Red-breasted sapsucker
Hairy woodpecker
Brown creeper

Other limitations of the models are: they were designed to be used with a timber volume classification scheme which has subsequently been replaced with an updated scheme; they were not developed for some of the species of concern; and they are not necessarily appropriate for use in population viability analysis. For all these reasons, most of the habitat capability models are not being used with the new TLMP (1997). Updated deer and marten models have been developed and used for the Control Lake Project Final EIS analysis. Other relevant measures of habitat quality or quantity are reported in the individual MIS discussions below.

Table 3-13 presents the results of the deer and marten model analyses for current conditions (1997) expressed as a percentage of the 1954 (prior to commercial harvest) capability.

Table 3-13
Estimated Deer and Marten Habitat Capabilities for 1997 Expressed as a Percentage of 1954 Habitat Capabilities

Species	1997 Habitat Capability (%)	Change from 1954 (%)
Black-tailed deer[1/]	86	-14
Marten[1/]	87	-13

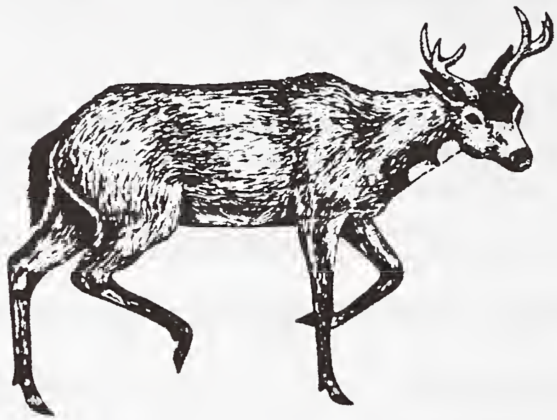
Sitka Black-tailed Deer

Sitka black-tailed deer (*Odocoileus hemionus*) is considered a generalist species that ranges through all major habitats on Prince of Wales Island. As an MIS, black-tailed deer represent other species that use lower elevation old-growth forest habitats during the winter.

Winter snow conditions affect deer populations through decreased forage availability, specifically in clearcut areas, and increased energy expenditures. The highest quality winter range exists on south-facing slopes below 800 feet in elevation, dominated by stands of timber in the high volume old-growth stratum. During periodic accumulations of snow, old growth-forest patches provide “optimal thermal cover” (Witmer et al., 1985). The combination of a dense canopy with scattered openings allows forage growth in the openings, while the canopy modifies snowfall sufficiently to promote availability of forage and movement of deer. Early successional stands provide forage for deer during mild winters and the remaining seasons.

Old-growth patches of 1,000 acres or larger are believed to provide optimum deer habitat. Deer winter range fragmented into isolated islands of old growth concentrates deer in predictable areas, offering less security from wolves by reducing predator search time (USDA Forest Service, 1991a).

During the 1993 Control Lake field inventory, biologists documented deer sightings and signs throughout the Project Area. These included deer sightings, scat, tracks, browse, beds, and travel corridors. High quality deer wintering areas were identified along the majority of the coastal shoreline and estuaries, around most of the lakes, and in the Drumlin area of the Honker Divide Watershed. The Project Team found that, when combined with winter range habitat identified by the Thorne Bay Ranger District, high quality habitat was most concentrated on the Western Peninsula, Election Creek, Steelhead Creek, and in the Honker watershed of the Control Lake Project Area. The Western Peninsula contains a high degree of natural fragmentation, with productive timber concentrated along the shoreline and stream corridors. This may result in greater sensitivity of this area to human-caused fragmentation. Currently, high quality deer winter range represents approximately 6 percent (12,407 acres) of the Project Area (including state/private lands). However, 55 percent of the Project Area now lies within non-development LUDs under the new Forest Plan (1997) and will be protected from future timber harvest. Results of the deer model indicate a 14 percent reduction in habitat capability since the start of the KPC contract in 1954 (Table 3-13). Currently, winter deer densities across the Project Area average approximately 15 deer per square mile.



No roads existed in the Project Area prior to 1954. Today, total road density is approximately 0.68 mile per square mile and open road density is approximately 0.57 mile per square mile. Road construction affects black-tailed deer habitat by displacing deer from preferred habitats, and increasing deer harvest opportunities in localized areas adjacent to roads (see *Subsistence* section). This is of particular concern when forest canopy cover adjacent to roads is limited (Thomas et al., 1979; Washington Department of Wildlife, 1987).

Black Bear

Black bears (*Ursus americanus*) range through all major habitat types found in the Project Area. They require large expanses of habitat, as well as protection from human disturbance. The availability of food and cover are the primary influences on the movements and distribution of black bears. Estuarine, riparian, and coastal habitats receive the highest use by black bears. Although many of their preferred plant foods grow in openings, bears prefer not to move very far from cover while foraging; therefore, they do not use large openings without cover (Suring et al., 1992).

The availability of den sites is also a critical determinant of habitat quality for bears. The characteristics of preferred sites in Southeast Alaska (e.g., hollow logs and trees, and a well-developed understory) are typically associated with old-growth forests (Suring et al., 1992).

Increased road densities, with accompanying increases in human access to areas, might negatively affect black bear populations, which are susceptible to overharvesting (Kolenosky and Strathearn, 1987). Road construction increases the chances of human disturbance which might result in the displacement of animals from their preferred habitats.

Bear sightings and signs were commonly observed throughout the Project Area during the 1993 field season. Dens were located in old-growth stands throughout the Project Area. The areas surrounding most of the bays within the Project Area provide important black bear habitat. Black bear habitat currently represents approximately 60 percent of the Project Area.

Wolf

Wolves (*Canis lupus*) are wide ranging, opportunistic predators (Paradiso and Nowak, 1982). The presence of wolves in an area, appears to be dictated primarily by the availability of habitat for its prey species (Carbyn, 1987) and the intensity of human-caused mortality (Mech et al., 1988; Mech, 1995). The wolf has adapted to a carnivorous diet made up mainly of large ungulates or beaver (*Castor canadensis*) and, when available, spawning salmon. Availability of suitable denning habitat is of secondary importance to wolves. In forested areas, dens are usually located on elevated knolls within 1,600 feet of water (Carbyn, 1987). Dens located on Prince of Wales Island have been in old-growth stands within 100 meters of freshwater (Person and Ingle, 1995).

Timber harvest and the construction of road systems on Prince of Wales Island has altered the habitat of wolves and their prey. The primary effect of high road densities is the increased accessibility to wolves they afford hunters. Wolves are reportedly intolerant of open road densities that exceed a 1.0 mile per square mile threshold (Mech, 1989; Fuller, 1989; Mech et al., 1988; and Thiel, 1985). Suring et al. (1992) recommends that road densities be maintained below this level within each WAA. All WAAs are currently below the 1.0 mile per square mile threshold. The 44 miles of shoreline within WAA 1323 provide additional access to the Western Peninsula for hunters and trappers. Although miles of shoreline are not included in road density calculation, the effects of shoreline access are considered in the development of access management plans.

The TLMP FEIS (1997) concludes, based on a conservative analysis (see pages 3-404 through 3-405), that areas supporting a deer habitat capability of 13 deer per square mile or greater, are likely to be able to support current wolf populations and the current level of harvest by humans. This threshold represents the current Forest Plan standard and guideline for wolves. This threshold is currently under review by an interagency team. The existing winter density of deer within the Project Area is approximately 15 deer per square mile.

The USFWS was petitioned to list the Alexander Archipelago wolf as threatened under the Endangered Species Act in 1993. The petition was based on several factors: present and threatened destruction, modification, and curtailment of habitat from the reduction and long-term degradation of habitat for Sitka black-tailed deer by clearcut logging; inadequate regulation of road access leading to increased shooting and trapping of wolves; and, other factors including inbreeding within insular populations that may reduce genetic fitness, adaptability, and long-term viability (USDI Fish and Wildlife Service, 1994). The USFWS undertook a status review of the Alexander Archipelago wolf and found that listing was not warranted at this time (USDI Fish and Wildlife Service, 1995). This conclusion was challenged in court, and the finding was remanded to the Secretary of the Interior for reconsideration. In August 1997, following release of the new Forest Plan, the USFWS again found that listing the wolf was not warranted, based largely on implementation of the new Forest Plan.

A study is currently underway on north-central Prince of Wales and the adjacent islands to determine distribution and abundance, home range, movements, habitat use, and the feeding ecology of the wolf. Information to date indicates that within Game Management Unit 2 (GMU-2), only Prince of Wales Island is sufficiently large to maintain a permanent wolf population in the absence of immigration from some other source. Average pack home range size for wolves on Prince of Wales Island is 264 square kilometers. This appears to be larger than home ranges reported for wolf packs in other studies where the primary prey is deer. An analysis of habitat use versus availability for three packs, based on radio locations, showed that the wolves selected highly productive forest (volume classes 5, 6, and 7) habitat, particularly in the winter. Two packs used low-volume stands more than expected and one pack used noncommercial habitat more than expected. All three packs used second-growth habitat significantly less than expected (Person and Ingle, 1995).

An interagency wolf conservation assessment has been conducted to synthesize available information on wolf ecology and identify management considerations for sustaining viable wolf populations on the Tongass (Person et al. 1996). The assessment concluded that wolf densities are generally lower on the mainland and higher on islands in the southern half of the Tongass. Principal concerns exist on Prince of Wales and Kosciusko Islands where past timber harvest has reduced deer habitat capability and resulted in road densities exceeding 0.7 road mile/square mile of land. Wolf mortality rates averaged 50 percent within a sample of radio-marked wolves from 1993-1995 on Prince of Wales Island; trapping and hunting harvest rates were positively correlated with road density. Planned timber harvest will continue to reduce deer habitat capability through reductions in important deer winter range (Person et al. 1996). Important components of a wolf conservation strategy include providing minimally roaded core habitats, maintaining wolf harvest within sustainable limits through regulations, and providing adequate deer habitat to support an abundant and stable deer population.

During the 1993 Control Lake field reconnaissance, the majority of the sightings and signs were observed in the Honker Block, Rio Roberts Watershed, Logjam Watershed, and the Western Peninsula Area. The areas surrounding the majority of the bays provide important wolf habitat.

Habitat capability model results for wolves are proportional to results for Sitka black-tailed deer. The deer model indicates a 14 percent decline from the pre-harvest (1954) level (Table 3-24).

Marten

Marten (*Martes americana*) prefer mature and old-growth forest and are closely associated with overmature stands with a canopy closure greater than 40 percent. The abundance of the shrub and forb layer in a typical old-growth stand, in conjunction with the structural diversity of its understory, supports a variety of small mammal prey species. Downfall, stumps or slash provide access routes allowing marten to hunt below deep snow. Overstory cover provides marten with protection from potential bird predators. The fallen logs, decadent trees, and large snags in old-growth forests provide resting and den sites for marten (Suring et al., 1992; Strickland and Douglas, 1987).

Marten represent a species group that uses lower elevation old-growth forest habitats during the winter period. Although forest management activities resulting in easier human access will increase potential for overtrapping, the quantity and quality of winter habitat is considered the most limiting factor for marten in Southeast Alaska. High quality winter range includes old-growth stands in coastal habitats (beach fringe and estuary) and riparian areas, as well as upland habitats below 1,500 feet in elevation. Optimum use of habitat occurs when patches of preferred habitat are greater than 180 acres, and use declines with decreasing patchsize, becoming zero when patches of preferred habitat are less that 10 acres (TLMP, 1991a).

Marten are easily trapped and are susceptible to overharvest. Road construction reduces cover and increases human access, thereby increasing trapping vulnerability, particularly when located within marten travel corridors (ridges, saddles, and riparian areas) and foraging areas (Warren, 1990). During the 1993 field reconnaissance, marten sign and sightings were documented along the Thorne River and Rio Beaver Creek, and on the Western Peninsula.

The largest patches of high quality marten habitat (400- to 5,000-acre blocks of unfragmented habitat) are located primarily within the Honker watershed, Cutthroat watershed, and along Elevenmile Creek, Election Creek, Upper Logjam Creek, and portions of Steelhead Creek. The majority of this habitat is associated with riparian and coastal habitats.

Currently, the unmodified and near-natural environment LUDs provide approximately 45 percent of the high quality marten habitat in the Project Area. Approximately 27 percent of the Project Area (including state/private lands) represents high quality habitat under existing conditions. Model results indicate a 13 percent reduction in marten habitat capability since 1954 (Table 3-13).

The TLMP Revision (1997) includes a Forest-wide program to conserve and provide habitat to assist in maintaining long-term sustainable marten populations. The new standards and guidelines include special features for protection of high quality marten habitat in higher risk biogeographic provinces. These provinces are defined as regions where significant amounts of past timber harvest has resulted in young conifer stands with little or no residual forest structure. The Control Lake Project Area is located within one of the high risk provinces, and contains two VCUs (577 and 597) that approach 33 percent previous harvest threshold. As specified in the ROD, for the TLMP Revision (1997), the new marten standards and guidelines will be implemented on the Control Lake Project Area as determined by an interagency implementation team consisting of NMFS, EPA, USFWS, ADF&G, and other pertinent state agencies.

River Otter

River otters (*Lutra canadensis*) are associated with both coastal and freshwater aquatic environments and the immediately adjacent (100 to 500 feet) upland habitats. High quality habitat occurs along the coast (beach fringe) and within riparian habitats along rivers, streams, and lakes up to 1,200 feet in elevation. Lakes larger than 50 acres provide optimum foraging opportunities. The primary food source of otters is fish, plus a minor component of marine invertebrates (Larsen, 1984). Several otter dens were found along the San Cristoval coastline within the Western Peninsula during the 1993 field inventory.

High quality habitat consists primarily of low-volume, old-growth stands situated along the shoreline of salt water, large lakes (larger than 50 acres), and Class I and II riparian areas. River otter habitat (97 percent) is almost exclusively located within unmodified and near-natural environment LUDs. Specific locations of high quality habitat include the upper Honker watershed, especially in the vicinity of larger lakes. Habitat is also found along either side of Thorne River in the lower portion of VCU 575, along Snakey Creek, within the lower Rio Roberts watershed, and on the Western Peninsula.

Bald Eagle

Bald eagle

Bald eagles (*Haliaeetus leucocephalus*) in Southeast Alaska prefer to nest adjacent to the coast where they forage for fish, waterbirds, marine invertebrates, and drifting carrion. Nests are typically located in old-growth coniferous forests along the coastline and associated saltwater inlets. Nest surveys conducted by the Forest Service and the USFWS, as well as the 1993 Control Lake field reconnaissance, documented a total of 35 nests along the Project Area coastline and inland along the Thorne River, Elevenmile Creek, Rio Roberts, and Cutthroat Creek. In addition, 7 nests are located at the perimeters of Thorne Lake, Big Island Lake, and Balls Lake. The majority of nests in the Control Lake Project Area are within the no-harvest Beach Fringe and Estuary zone or the Riparian Management Area.

Vancouver Canada Goose

The Vancouver Canada goose (*Branta canadensis fulva*) is a relatively nonmigratory species. They are unique among all subspecies of Canada geese in that they use forested habitat for nesting and brood-rearing (Lebeda and Ratti, 1983). High-quality nesting and brood-rearing habitat is generally associated with low volume old growth on poorly drained soils, adjacent to small wetlands, lakes, and riparian areas. Beach fringe and estuary areas are high-quality habitats for Vancouver Canada geese.

Hansen (1962) indicated that nesting and brood-rearing is probably the most limiting habitat factor.

The largest patch of high quality Vancouver Canada goose habitat is in the northernmost portion of the Project Area, overlapping the Logjam Creek watershed and Honker watershed. The remaining high quality habitat consists of moderate-sized patches scattered throughout the Control Lake Project Area.

The Project Team documented the Canada goose use throughout the Project Area during the 1993 field season. Sightings and sign observed by the team were often along the shoreline of lakes and ponds, as well as in muskegs.

Red-breasted Sapsucker

The red-breasted sapsucker (*Sphyrapicus ruber*) represents the group of cavity-excavating and cavity-using species requiring old-growth habitat.

The size of red-breasted sapsucker populations in an area is directly related to the quantity of snags. Nest trees range from 10 to 32 inches dbh; although sapsuckers use smaller diameter trees, productivity may increase when larger diameter trees are available. Forest stands over 2,000 feet in elevation are not considered valuable as habitat for red-breasted sapsuckers. Highest levels of use occur when patches of old growth are larger than 250 acres; use declines to zero when patches of preferred habitat are smaller than 5 acres (Suring et al., 1993).

High quality sapsucker habitat is extensive, occurring throughout the Project Area and encompassing all old-growth habitat below 2,000 feet in elevation. High quality habitat is concentrated primarily in the Honker watershed and north of Big Salt Lake. Habitat patches on the Western Peninsula are relatively small and more distant from each other, corresponding with the naturally fragmented landscape within this area.

Hairy Woodpecker

Although hairy woodpeckers (*Picoides villosus*) are listed as uncommon residents throughout Southeast Alaska, the Project Team observed sightings and sign on numerous occasions within the Project Area. These primary cavity excavators require old-growth forest habitats with snags and partially dead trees for foraging and nesting. Optimum use occurs when patches of preferred habitat are larger than 500 acres. Use declines to zero when patches are smaller than 10 acres (TLMP, 1991a).

Winter roosting and foraging habitat are considered to be the limiting factor for resident cavity-nesting birds (Raphael and White, 1984). Habitats used during the winter are below elevation 1,500 feet and are characterized by a high, dense canopy cover provided by large, widely spaced trees. High-quality habitat for the hairy woodpecker is scattered throughout the Project Area and closely follows old-growth forest distribution.

Brown Creeper

The brown creeper (*Certhia americana*) forages almost exclusively on the trunks of trees in conifer forests (Morse, 1970). They represent species dependent on high volume old-growth; for brown creepers, the tree size is more important than the tree species. Large-diameter trees allow the birds to feed longer and capture more beetle larvae (their primary prey) per visit, as well as reducing their exposure during cold, windy weather.

Studies suggest that winter habitat is the limiting factor for cavity-nesting birds, including the brown creeper (Raphael and White, 1984). Old-growth conifer stands below elevation 1,500 feet, and greater than 20,000 BF per acre, are the preferred habitat. Optimum use occurs when high-volume old-growth patches are larger than 15 acres, and use declines to zero when patches are smaller than one acre (Suring et al., 1993). During the 1993 field inventory, brown creeper observations were documented along the Thorne River and within the Rio Beaver and Rio Roberts watersheds. There are currently approximately 30,803 acres of old-growth stands within the high volume stratum in non-encumbered National Forest System lands in the Project Area.

Threatened, Endangered, and Sensitive Species

Key Terms

Candidate—a species for which the USFWS or NMFS has on file sufficient information to support issuance of a proposed rule to list the species under the Endangered Species Act; none of these occur on the Tongass National Forest.
Endangered—a species in danger of extinction throughout all or a significant portion of its range.
Haul out—area of large, smooth, exposed rocks used by seals and sea lions for resting and pupping.
Sensitive—species (identified by the Regional Forester) whose population viability is of concern on national forests within the region, and which may need special management to prevent their being placed on State and Federal threatened and endangered species lists.
Threatened—a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Federally listed threatened and endangered species are those plants and animals formally listed by the USFWS or the National Marine Fisheries Service (NMFS), under the authority of the Endangered Species Act of 1973, as amended. Candidate species are those that may be appropriate for listing as threatened or endangered by the USFWS or NMFS. No candidate species currently occur on the Tongass National Forest. Species were also formerly designated as "species of concern" by the USFWS. This category has since been dropped by the USFWS. The State of Alaska has an Endangered Species Law which authorizes the Commissioner of the ADF&G to list species which are endangered in Alaska. The Regional Forester of the Forest Service can also designate species as "sensitive." Sensitive species are those plant and animal species for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Information on threatened, endangered, and sensitive species distributions and occurrences in the Project Area was obtained from agency contacts, a review of the available literature on these species in Southeast Alaska, and a general walk-through of each proposed harvest unit by ID survey teams. In addition, specific surveys were conducted for northern goshawks and marbled murrelets following USFWS and/or Forest Service accepted protocols.

Plants

The policy of the Tongass National Forest is to "provide sufficient habitat to preclude the need for listing species under the Endangered Species Act due to National Forest habitat conditions" (TLMP, 1997). Plants of concern are listed by the USFWS as endangered or threatened under the Endangered Species Act of 1973 or species identified as sensitive by the Regional Forester. Under the Endangered Species Act , an endangered species is defined as one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as one that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Currently, no plant species native to Southeast Alaska are Federally listed as endangered or threatened. However, four species were formerly considered species of concern (TLMP, 1997). These species have evidence supporting formal listing as threatened or endangered but adequate information is not yet available on biological vulnerability or threats to justify final listing. None of these species has been found in the Tongass

National Forest so far, and potential habitat for only one of the species, thickglume reedgrass (*Calamagrostis crassiglumis*), exists within the Control Lake Project Area.

Currently, there are 11 species (including *Carex lenticularis* var. *dolia* which is also a species of concern) on the Region 10 list of sensitive plant species that may occur in the Project Area. One of the Region 10 sensitive species is known to occur in the Project Area, and several species are suspected to occur. No observations of Region 10 sensitive plant species were made in the Project Area based on field reconnaissance of potential harvest units and roads by interdisciplinarily trained teams. Potential for occurrence of sensitive plants in the Project Area is summarized in Table 3-14.

Fish

No threatened, endangered, or sensitive fish species occur in the Project Area.

Wildlife

Two Federally endangered wildlife species—the humpback whale (*Megaptera novaeangliae*) and Eskimo curlew (*Numenius borealis*)—potentially migrate near or through the area, and three Federally threatened species—the Aleutian Canada goose (*Branta canadensis leucopareia*), American peregrine falcon (*Falco peregrinus anatum*), and Steller sea lion (*Eumetopias jubatus*)—potentially migrate through or occur in the Prince of Wales Island area. Also, eight species formerly designated as Federal species of concern—the Alexander Archipelago wolf (*Canis lupus ligoni*), Arctic peregrine falcon (*Falco peregrinus tundris*), marbled murrelet (*Brachyramphus marmoratum*), Kittilitz's murrelet (*Brachyramphus brevirostris*), Queen Charlotte goshawk (*Accipiter gentilis laingi*), harlequin duck (*Histrionicus histrionicus*), olive-sided flycatcher (*Cantopus borealis*), and the spotted frog (*Rana pretiosa*)—potentially occur in the area. The Peale's peregrine falcon (*Falco peregrinus pealei*), osprey (*Pardion haliaetus*), and trumpeter swan (*Cygnus buccinator*), Forest Service Region 10 sensitive species, also occur on the island. The Queen Charlotte goshawk is also on the Forest Service Region 10 sensitive species list. The Prince of Wales spruce grouse (*Dendragapus canaderis*) is addressed in this section, even though it is not a threatened, endangered, or sensitive species, because of concern expressed by the ADF&G.

Humpback Whale

Humpback whales are found in coastal areas or near oceanic islands and appear to have a preference for nearshore waters, especially the highly productive fjords of Southeast Alaska and Prince William Sound (Calkins, 1986). Humpbacks remain in the Gulf of Alaska throughout the summer and fall and begin their southward migration in November; however, some humpbacks have been reported to winter in Southeast Alaska waters (Calkins, 1986). The current population of humpback whales in the North Pacific is estimated at between 1,200 and 2,000 animals (National Marine Fisheries Service, 1991), less than 10 percent of the estimated pre-exploitation population size (Johnson and Wolman, 1984). Currently, about 300 to 350 whales, or 30 to 35 percent of the entire North Pacific population of humpbacks (Calkins, 1986), gather in Southeast Alaska waters during the summer and fall to feed on abundant populations of euphausiids (*Euphausia pacifica*), Pacific herring (*Clupea harengus*), and capelin (*Mallotus villosus*) (Johnson and Wolman, 1984).

Because the humpback whale occupies nearshore waters, it is especially vulnerable to environmental degradation and human disturbances associated with off-shore petroleum exploration and production, ocean dumping, toxic chemical pollution, coastal logging, mining and manufacturing, fishing, resort development, and pleasure boat and cruise ship traffic (Johnson and Wolman, 1984). Such activities may disrupt whale feeding or result in damage to important habitat areas (Johnson and Wolman, 1984). Critical habitat has not been designated for humpback whales; however, summer and fall concentrations of humpback whales have been

Table 3-14
Sensitive Plant Species Potentially Occurring in the Project Area

Species	Potential for Occurrence in Project Area
Carex lenticularis var. *dolia*	Not likely; coastal mountains of southern Alaska, but not in forested areas.
Cirsium edule	Not expected based on range; wet meadows and open woods along glacial streams.
Glyceria leptostachya	May occur in wet lowland habitats including swamps, and stream and lake margins; known from Control Lake vicinity on POW Island.
Hymenophyllum wrightii	May occur in humid, shaded habitats in association with boulders, cliffs, and tree trunks; not known from POW Island.
Isoetes truncata	May occur in shallow water of lakes and streams; not known from POW Island.
Lingusticum calderi	May occur on rocky cliffs; open, boggy, or rocky slopes; and forest edges in alpine or subalpine areas. Not known from POW Island.
Platanthera chorisiana	Not likely in heaths, swamps, and sphagnum bogs; not known south of Chicagof Island.
Plantanthera gracilis	May occur in wet open meadow habitats; not known from POW Island.
Poa laxiflora	May occur in moist, open, lowland woods and open forested meadows; not known from POW Island.
Ranunculus orthorhynchus var. *alaschensis*	May occur in moist, open lowland meadows and other moist, open habitats; known from near Craig.
Senecio moresbiensis	May occur in shady, wet areas and bogs on open, rocky, or boggy slopes and in open, rocky heath and grass communities; known from Kasaan Mountain on POW Island.

Source: USDA Forest Service, 1994.
[1/] POW Prince of Wales

observed in Southeast Alaska at Frederick Sound, Salisbury Sound, Stephans Passage, and Glacier Bay (Baker et al., 1985; Calkins, 1986). Humpbacks may occur throughout Southeast Alaska, including the waters surrounding Prince of Wales Island. For example, humpback whales were observed in Clarence Strait off Coffman Cove in September 1993 by project biologists.

Steller Sea Lion

The Steller sea lion is widely distributed over the continental shelf and throughout the coastal waters of the Gulf of Alaska (Calkins, 1986). Although population declines have been reported throughout most of the range of this species, sea lions in Southeast Alaska have experienced less dramatic population declines (TLMP, 1991a).

The most significant factors affecting Steller sea lion populations include: (1) reductions in availability of food; (2) commercial harvest of pups; (3) subsistence harvest of sea lions; (4) harvests for public display and scientific research purposes; (5) predation by sharks, killer whales (*Orcinus orca*), and brown bears (*Ursus arctos*); (6) disease; (7) inadequate regulatory mechanisms such as quotas on incidental harvest during commercial fishing operations; and (8) other natural or human factors such as illegal shooting of adult sea lions at rookeries, haul-out sites, and in the water near boats (TLMP, 1991a). None of these factors are regulated by or are within the jurisdiction of the Forest Service, and critical habitat for Steller sea lions has currently not been designated. However, a Steller sea lion haul-out has been located by the NMFS on the southern point of Grindall Island just south of the Kasaan Peninsula at Baker Point (letter from S. Pennoyer, NMFS, Anchorage, Alaska, February 6, 1992). The nearest LTF associated with the project occurs at Thorne Bay, approximately 24 miles northwest of this haul-out; the haul-out is currently exposed to log shipment activities originating from Forest Service and private LTFs. The nearest Steller sea lion rookery occurs over 60 miles southwest of the Project Area boundary at Forrester Island (Loughlin et al., 1984).

Alexander Archipelago Wolf

Because the Alexander Archipelago Wolf is a MIS species, it is addressed in the *Wildlife* section.

American Peregrine Falcon

The American peregrine falcon is primarily associated with the boreal forest region of interior Alaska (USFWS, 1982; Craig, 1986). It occurs in Southeast Alaska only during migration periods (letter from N. Holmberg, USFWS, Anchorage, Alaska, March 5, 1992; USDA Forest Service, 1992c). Population declines in peregrine falcons occurred after World War II and were due primarily to reductions in breeding habitat and contamination from organochloride pesticides (USFWS, 1982). However, this subspecies has recently experienced increases in population and reproduction, and the USFWS has recently (October 5, 1994) down-listed the species from endangered to threatened.

Actual migration routes and foraging areas of peregrine falcons in Southeast Alaska have not been identified and specific use of the Project Area is unknown. However, the Project Area is within the migratory pathway of American peregrine falcons (Anderson et al., 1988), although most coastal migrants are apparently the non-listed Peale's (*F. p. pealei*) subspecies and most American peregrines migrate inland. Peregrines potentially migrating through the area probably forage on prey species that they are known to use elsewhere, including shorebirds, waterfowl, and songbirds (Anderson et al., 1980). Marshes and riparian areas are particularly important peregrine feeding areas, since they attract and concentrate prey species (Craig, 1986).

Arctic Peregrine Falcon

The Arctic peregrine falcon is primarily associated with the area north of the Brooks Range and Seward Peninsula; it is highly migratory, wintering as far south as northern Argentina (Ambrose et al., 1988). It occurs in Southeast Alaska only during migration periods. Population numbers have increased three-fold in Alaska (ADF&G letter, Feb. 6, 1987; Ambrose et al., 1988; minutes of Interagency Wildlife Technical Committee Meeting of March 20, 1991). Effective November 4, 1994, the USFWS removed the species from the threatened list. It now has the status of a species of concern.

Peale's Peregrine Falcon

The Peale's subspecies of the peregrine falcon (*F. p. pealei*) nests on the outer islands west of the Project Area (Schempf, 1981, 1982). An active peregrine falcon nest, probably of this subspecies, was recently discovered in the Steelhead Creek drainage of the Project Area. This subspecies is not listed as endangered or threatened, but is covered by a provision of the "similarity of appearance" which broadens the scope of protection for all peregrine falcons. The nest distribution of this subspecies is closely associated with large seabird colonies, and seabirds are believed to be the major prey of the falcon.

Osprey

Osprey occur in low numbers in Southeast Alaska during the spring/summer nesting period from late April through August. They are believed to overwinter in Mexico and Central America. Osprey have been observed along the lower Thorne River during migration, but all documented nest sites occur outside the Control Lake Project Area. There are eight documented osprey nest sites and four known nesting pairs at Thomas Bay, Wrangell Narrows near Finger Point, and near the mouth of McCormick Creek on Wrangell Island (Hughes, undated, as cited in USDA Forest Service 1991b). Sightings of osprey have also been recorded at Towers Arm, Irish Lakes, and Kah Sheets on Kupreanof Island. Nest trees in these areas consist of broken-top spruce (live or dead) and snags of western hemlock in hemlock/spruce forest types near streams or coastal beaches. Historically, the Southeast Alaska population of osprey appears to have remained stable but low. It is unknown why osprey occur in relatively low numbers in this region, but available nest sites and foraging areas do not appear to be limiting factors.

Eskimo Curlew

Eskimo curlews once ranged from arctic North America to southern South America, migrating seasonally by way of the Atlantic and Central flyways (Gollop, 1988). The species formerly occupied western and northern Alaska, but is now considered an accidental in Alaska (Armstrong, 1991) and one of the rarest birds in North America (Gollop, 1988). Eskimo curlews migrate along the Alaskan interior and any occurrences along coastal regions are highly unlikely (Armstrong, 1991). The species has not been sighted in Alaska since 1986 (Armstrong, 1991).

Trumpeter Swan

Trumpeter swans winter in specific ice-free areas throughout Southeast Alaska (letter from J. N. West, Forest Service, Ketchikan, Alaska, to C. Crocker-Bedford, Forest Service, Ketchikan, Alaska, July 2, 1991). However, swans appear to show extreme fidelity to specific wintering

areas (Gale, 1989). Although information on wintering habitats and populations of trumpeter swans in Southeast Alaska is limited, in general swans winter along estuaries, intertidal lakes, streams, and muskegs (letter from C. Crocker-Bedford, USDA Forest Service, Ketchikan, Alaska, July 2, 1991). Wintering locations include open areas with adjoining grassflats with level terrain that allow swans to rest, feed, or fly without restricting visibility or movement. Swans wintering on Prince of Wales Island tend to use areas with good winter sun exposure and protection from prevailing southeasterly winds (letter from C. Crocker-Bedford, USDA Forest Service, Ketchikan, Alaska, July 2, 1991).

Major concentration areas of wintering trumpeter swans nearest the Project Area include Sweetwater Lake, Sarkar Lakes, Big Salt Lake, and the Thorne River. Prince of Wales Island (Belrose, 1976) and specifically Sweetwater Lake and Sarkar Lakes (Olson, 1978) has long been recognized as important wintering areas for this bird. Each support 25 to 100 swans annually (USDA Forest Service files). In addition, up to 30 birds are found each winter using Big Salt Lake (USDA Forest Service files). Within the Project Area, small numbers (1 to 20) of trumpeter swans can be found wintering at the Honker Divide open water areas (Honker Lake, Hatchery Lake, Lake Galea, upper Thorne River, etc.), at Control Lake, and in the lower Thorne River near the estuary and Goose Creek (USDA Forest Service files).

Aleutian Canada Goose

The Aleutian Canada goose nests on Buldir and Chagulak islands in the Aleutian Archipelago and winters primarily in the San Joaquin Valley of California (Amaral, 1985). The species sometimes stops along the Oregon coast and occasionally is reported along the Washington coast while on way to wintering grounds in California (Amaral, 1985). Aleutian Canada geese are believed to have historically wintered from British Columbia to California (Amaral, 1985). Although there are no records of Aleutian Canada geese on Prince of Wales Island, the area is within their migratory route (personal communication, J. Lindell, Endangered Species Coordinator, USFWS, Anchorage, Alaska, September 18, 1992). Any migrating geese stopping over on Prince of Wales Island would likely be found resting in the coastal wetland areas.

Marbled Murrelet

The marbled murrelet was recently listed as threatened in California, Oregon, and Washington. Marbled murrelets, however, are abundant in Alaska where they are currently considered as a species of concern. Recent estimates by Piatt and Ford (1993) place the Alaska population of marbled murrelets at between 153,030 and 166,470 with an estimated 96,200 birds occurring within the Alexander Archipelago during the breeding season.

Between 1989 and 1993, approximately 43 tree nest sites were found in North America, at least 17 of which were found in Alaska (Naslund and Hamer, 1993). Nest sites have been located in mature and old-growth forests comprised of Douglas-fir, coast redwood (*Sequoia sempervirens*), western red cedar, mountain hemlock, Sitka spruce, and western hemlock (Ralph and Nelson, 1992). Five nest sites in Southcentral Alaska were located in mountain hemlock (personal communication, T. Hamer, Hamer Environmental, Sedro Woolley, Washington, May 25, 1992), while two nest sites found in British Columbia were located in Sitka spruce. In addition, during field investigations for the nearby Polk Inlet Project, marbled murrelet eggshell fragment were found at three locations, indicating the existence of three nest sites. Subsequent examinations of surrounding trees led to the actual discovery of a marbled murrelet nest site at one of the locations. Only two other marbled murrelet nest sites have been located in Southeast Alaska, including a nest found near Hatchery Creek immediately north of the Project Area on

July 23, 1993 (Quilan and Hughes, 1990; Ford and Brown, 1995). The Hatchery Creek nest was located on an exposed western hemlock root overhanging an 11-m cliff.

The limited data on marbled murrelet nesting behavior are inconclusive regarding nest-site fidelity. Marshall (1988) observed a murrelet nest in California in a tree that appeared to be used over a period of several years. However, Ralph and Nelson (1992) indicate that murrelets (no location given) are not known to reuse individual nest trees. Based on high nest-site fidelity observed in other alcid species, it is highly probable that marbled murrelets at least have strong fidelity to certain forest stands that have been used for nesting (personal communication, T. Hamer, Hamer Environmental, Sedro Woolley, Washington, September 24, 1992). This is supported by recent work on murrelet nesting behavior in California where murrelets have been observed repeatedly nesting in "loose" colonies in different portions of the same forest stand (Marshall, 1988; Ralph and Nelson, 1992).

Three primary factors that may limit marbled murrelet reproduction or survival include removal of old-growth habitat, mortality from gill-net fisheries, and oil pollution (Marshall, 1988). Information on murrelet nesting mortality indicates that this species is also highly susceptible to nest-site predation from avian predators that are associated with forest edges and fragmented landscapes. For example, the exposed Hatchery Creek nest failed, apparently very soon after hatching (personal communication, Cheri Ford). Consequently, fragmentations of contiguous old-growth areas by logging and associated predator concentrations along forest edges have the potential to adversely affect murrelet nesting success within an area (personal communication, T. Hamer, Hamer Environmental, Sedro Woolley, Washington, September 25, 1992).

Prince of Wales Island, and the Project Area in particular, is heavily used by nesting marbled murrelets. During this project, marbled murrelets were detected at 96 percent (26) of 27 harvest units surveyed for these birds between June 25 and August 3, 1993. Units selected for surveying were generally dominated by larger timber and volumes and had an average slope of less than 50 percent. The number of birds detected per unit ranged between 2 and 133, and averaged 45. Occupancy behaviors, indicative of nesting occurring within the stand, were noted in at least 11 (41 percent) units. However, 12 to 133 birds were detected in 12 of the units where occupancy behaviors were not noted, indicating a likelihood that some of these birds were nesting in these stands as well. In addition, marbled murrelet eggshell fragments were found in a muskeg near harvest unit 595-411 on June 23, 1993, and a whole egg was found also in a muskeg near unit 577-425 on July 29, 1993.

Close examination of murrelet survey results suggests a possible relationship between the degree of fragmentation of the area and the percent occupancy behavior, and average number of birds detected (Table 3-15). Lowest values for both categories were observed for harvest units in the western peninsula area, and highest values for both categories were observed in the Honker Divide area. The western peninsula area has the greatest degree of old-growth fragmentation (most natural), while the Honker Divide area has the lowest degree of the four areas studied (refer to Existing Environment map in Chapter 2).

Table 3-15
Marbled Murrelet Survey Results by Area Sampled

Area	VCUs	No. of Units Surveyed	% Occupancy Observed	Avg. No. of Birds Detected
Western Peninsula	591, 592, 593	11	27.0	30.5
Steelhead Creek	595	6	33.0	51.0
Logjam Creek	577	2	50.0	39.0
Honker Divide	574, 575, 576, 578	8	62.5	65.1

Kittlitz's Murrelet

Kittlitz's murrelet is a small seabird belonging to the Alcidae family. Information is limited on the natural history of this species. Kittlitz's murrelet is distributed near glacial waters from Pt. Barrow south to at least Glacier Bay, most commonly from Cape Prince of Wales south to Glacier Bay from spring through fall (Robbins et al., 1983; Peterson, 1990). Winters are spent feeding in offshore pelagic waters. Kittlitz's murrelet forages on crustaceans in inshore marine waters during the breeding and nesting season in Alaska. Nests are generally located inland on the ground above the timberline in coastal mountains at the base of north-facing slopes. Nesting may also occur on unvegetated glacial moraines, grassy ledges of island sea cliffs, and barren ground on coasts (Ehrlich et al., 1988). One egg per clutch is laid on the bare ground amid lichen-covered rocks. Young Kittlitz's murrelets born at inland nests are believed to swim down streams to reach the sea.

Queen Charlotte Goshawk

The northern goshawk inhabits forested lands throughout North America, favoring dense stands of conifer or deciduous old growth for nesting habitat. The Queen Charlotte goshawk is recognized as a distinct subspecies, and as such is found only in coastal areas of British Columbia and in Southeast Alaska. Within Southeast Alaska, the goshawk appears to be non-migratory, although it may occupy different, or overlapping, winter and breeding territories. Goshawks are medium-sized hawks and prey primarily on other birds (within Southeast Alaska, Steller's jay and varied thrush are common prey species). Prior to recent field studies, very little was known about goshawks within the Tongass. (See also Table 3-109.)

A viability concern exists for the northern goshawk in Southeast Alaska due to its association with mature and old-growth forests and the decline in these habitats from timber harvesting. This concern was highlighted when the USFWS received and accepted a petition in 1994 to list the Queen Charlotte goshawk as endangered under the Endangered Species Act. In 1995, the USFWS determined that listing was not warranted at that time. This conclusion was challenged in court, and the findings were remanded to the Secretary of the Interior for reconsideration. In August 1997, the USFWS again found that listing the species was not warranted, based largely on implementation of the new Forest Plan.

A conservation assessment (Iverson et al., 1996) has been conducted to synthesize literature and original data from Southeast Alaska to described the habitat relationships and conservation status of the northern goshawk. Productive old-growth forest is an important component of goshawk habitat use patterns. Radio-marked goshawks consistently select this forest habitat type relative to availability, with 68 percent of all relocations occurring in productive old growth forest. Most other habitat types (such as alpine, subalpine, peatland [muskeg], and clearcuts) were used infrequently or avoided by goshawks. Timber harvesting in the Tongass (and on private lands in Southeast Alaska) results in the conversion of old-growth forest— a selected habitat type, to young-growth forest— an avoided habitat type, and thus suggests decline in goshawk habitat capability.

Iverson et al. (1996) evaluated a variety of silvicultural techniques and concluded that stand structures selected by goshawks could be maintained using uneven-aged practices. Additionally, they concluded that goshawk habitat theoretically could be maintained across the landscape under a 300-year rotation. A risk assessment using a conceptual 300-year rotation revealed that several landscapes (including the North Prince of Wales biogeographic province) within the Tongass may be at increased risk of not sustaining goshawks under current management. The assessment suggests that a combination of reserve-based and dynamic-landscape management approaches could sustain well-distributed viable populations of goshawks across the Tongass.

Goshawk surveys were conducted in the Project Area during the summer of 1993. Fifty-four potential harvest units with timber volumes of 8 MBF/acre or higher were surveyed between June 18 and July 23. In addition, over 25 miles of secondary roads were surveyed, targeting road systems not surveyed by ADF&G the previous summer. No goshawks were detected during these surveys except at Harvest Unit 596-426 where a single goshawk was observed at two different calling stations on June 23. A follow-up survey was conducted, but no birds were redetected.

In addition, goshawk sightings or suspected goshawk sightings were made at three different potential harvest units during resource surveys. On July 23, an alarmed goshawk was observed at a potential harvest unit near Logjam Creek in the northwestern corner of the Project Area. A nest site and one fledged juvenile were subsequently found by Forest Service biologists near the unit on July 31. On August 4, the juvenile and the adult male were captured and radio-tagged by Forest Service and ADF&G biologists. The male was later found dead (on November 3) near Coffman Creek, apparently from starvation.

Suspected goshawk sightings were also made on July 23 at Unit 593-406, and on August 3 at Unit 593-417. Because these two units are only one mile apart, the sightings may have been of the same bird or its mate. No goshawks were detected at these units during follow-up surveys.

On June 15, 1995, a second goshawk nest was found within the Project Area in the lower Rio Roberts drainage, south of the 30 Road. Both adults were radio-tagged in an effort to collect home range information. By the end of July 1995, two young had been fledged from the nest. This nest is currently abandoned and was relocated north of the 30 Road.

Harlequin Duck

In Alaska, the harlequin duck has been reported as a fairly common year-round resident, and at one season or another, has been recorded over much of the state except the Arctic coast (Gabrielson and Lincoln, 1959). Its range includes northeast Siberia and extends south to Wyoming and California. On the east coast it occurs in Iceland, Greenland, and Labrador and winters as far south as New Jersey. Available evidence indicates that the species breeds locally over much of southern Alaska, probably the Aleutians, and north to Anaktuvuk Pass. All ornithologists who have worked during the spring and summer months in the Alexander Archipelago and other parts of Southeast Alaska have commented upon the numbers of these ducks, frequently summarizing their observations by stating that they were common or abundant (Gabrielson and Lincoln, 1959). They nest along inland fast-moving rivers and streams, usually within 6 feet (but up to 60 feet) of water (DeGraaf et al., 1991). During the winter the harlequin duck is common to abundant in the coastal waters of Southeast Alaska, Prince William Sound, Cook Inlet, the bays of the Alaska Peninsula, the Aleutians and the Pribilofs (Gabrielson and Lincoln, 1959).

Olive-sided Flycatcher

The olive-sided flycatcher breeds in wooded regions from central Alaska east to Newfoundland and south to northern Baja California and central Arizona in the West, central Minnesota and northern Michigan in the Central States, and North Carolina and Tennessee in the East. The species winters in South America. It inhabits open coniferous forests and forest edges along lakes, streams, and muskegs (Bent, 1942). Godfrey (1979) described the habitat of the species as "burntlands with standing dead trees, bogs, lakeshores with water-killed trees, lumbered areas, and other clearings in woodland; sometimes tall trees about farmland, occasionally orchards." DellaSala et al. (1994) noted that the species was often observed using habitats associated with lakes and muskegs during a breeding bird study on central Prince of Wales Island.

Spotted Frog

Distribution of the spotted frog in Southeast Alaska is confined to coastal forests where it breeds in association with permanent bodies of water, including grassy margins of lakes, rivers, and streams (Hodge, 1976; Broderson, 1982; Nussbaum et al., 1983). Although the species is primarily aquatic (Hodge, 1976; Broderson, 1982; Nussbaum et al., 1983), spotted frogs have been reported moving overland in spring and summer (Behler and King, 1979).

Declines in the distribution and abundance of spotted frogs have been noted in western Canada and the Pacific Northwest (McAllister and Leonard, 1991), and these declines are apparently related to destruction of terrestrial and aquatic habitats and predation by bullfrogs (*Rana catesbeiana*) (Nussbaum et al., 1983; McAllister and Leonard, 1991b). Consequently, spotted frogs are a Federal Candidate 2 species, and are currently being considered for listing in portions of their range (McAllister and Leonard, 1991; personal communication, K. McAllister, Washington Department of Wildlife, Nongame Program, Olympia, Washington, August 18, 1992).

No spotted frogs were observed during reconnaissance surveys of potential harvest units conducted by ID survey teams.

Prince of Wales Spruce Grouse

The Prince of Wales spruce grouse is another species of concern in Southeast Alaska, although it is not listed as threatened, endangered, sensitive, or as a candidate. A nest was observed near the head of Twelvemile Arm in the Polk Inlet Project Area in 1903 (Osgood, 1903) and an observation of a female with chicks was made in this area in 1992 (Gustafson, 1994). The species uses old-growth forests, especially those containing spruce, young second growth prior to canopy closure, as well as other habitats. The subspecies is considered to be present in low densities on and near Prince of Wales Island by Gustafson (1994); however, the frequency of observations by Forest Service biologists suggest it is fairly common, at least in the Control Lake Project Area (personal communication, Cheri Ford, July 26, 1995). A study of the "Habitat Relationships of Spruce Grouse in Southeast Alaska" is ongoing.

Biodiversity

Key Terms

Biodiversity—the variety of lifeforms in an area, including variation in structure, composition and function at scales from genetic to landscape.
Canopy— uppermost layer of foliage in the forest.
Corridor—a patch, strip, or linear feature of habitat linking or providing connectivity between larger patches.
Edge—boundary between two distinct ecosystems, such as between forest and muskeg.
Edge effects—the biological and abiotic actions operating at edges; examples are differences in microclimate, species richness, productivity, and predation.
Fragmented—reduced in size and connectivity. The degree of fragmentation is dependent upon scale (in space and time) and species specific life requisites.
Forage—to search for food.
Patch—an assemblage of similar vegetation. In this document, the focus is on old-growth forests of greater than 8,000 board feet/acre, with only small inclusions of other habitats.
Planning area—for the purpose of analyzing viable populations, the planning area is the ecological province, i.e., North Central Prince of Wales Province and South Prince of Wales Province.
Snag—standing dead tree.
Viable population—the number of individuals of a species required to ensure the long-term existence of the species in natural, self-sustaining populations well distributed throughout their range in the National Forest.

Biodiversity can be defined as the variety of all the plant and animal communities and species within an area, as well as associated ecological processes including maintenance of well-distributed viable populations of species. The TLMP Final EIS discusses biodiversity in detail on pages 3-11 through 3-26 and is incorporated here by reference.

Appendix N of the TLMP Final EIS summarizes the results of additional analysis and risk assessments of wildlife habitat conservation measures incorporated into the Forest Plan, including components of biodiversity. Appendix N is incorporated here by reference.

In the 1997 ROD (page 35) for the Forest Plan, the Regional Forester states: "Our understanding of the biological diversity of the complex old-growth ecosystem of the Tongass National Forest, including its composition, function and structure, is continually growing. Given the complexities involved, management decision necessarily will involve some degree of uncertainty. Based on my review of the record, including the Final EIS and Appendix N, I find that the old-growth strategy and specific species management prescriptions represent a balance of wildlife habitat conservation measures which consider the best available scientific information and, within an acceptable level of risk inherent in projecting management effects, will provide fish and wildlife habitat to maintain well-distributed viable populations of vertebrate species in the planning area, and maintain the diversity of plants and animals."

The new Forest Plan has incorporated a comprehensive conservation biology strategy to assure long-term species viability as documented in the TLMP Final EIS including Appendix N. The TLMP ROD incorporated additional standards and guidelines to be applied with projects designed to strengthen certain species considered at higher risk in the Tongass National Forest.

The conservation of biological diversity commonly requires a dual strategy addressing both individual species as well as entire ecosystems (Marcot et al., 1994). The traditional species-by-species approach is important for featured or management indicator species, sensitive or rare species, and for recovery of federally designated threatened or endangered species. Additionally, and perhaps more important, a more comprehensive strategy focused on higher levels of biological organization and ecosystems may be necessary to conserve rare or declining habitats such as old-growth forests, plant and animal communities, and ecosystems, as well as the entire complement of associated biota and ecological processes (Noss, 1991; Scott et al., 1991; Franklin, 1993).

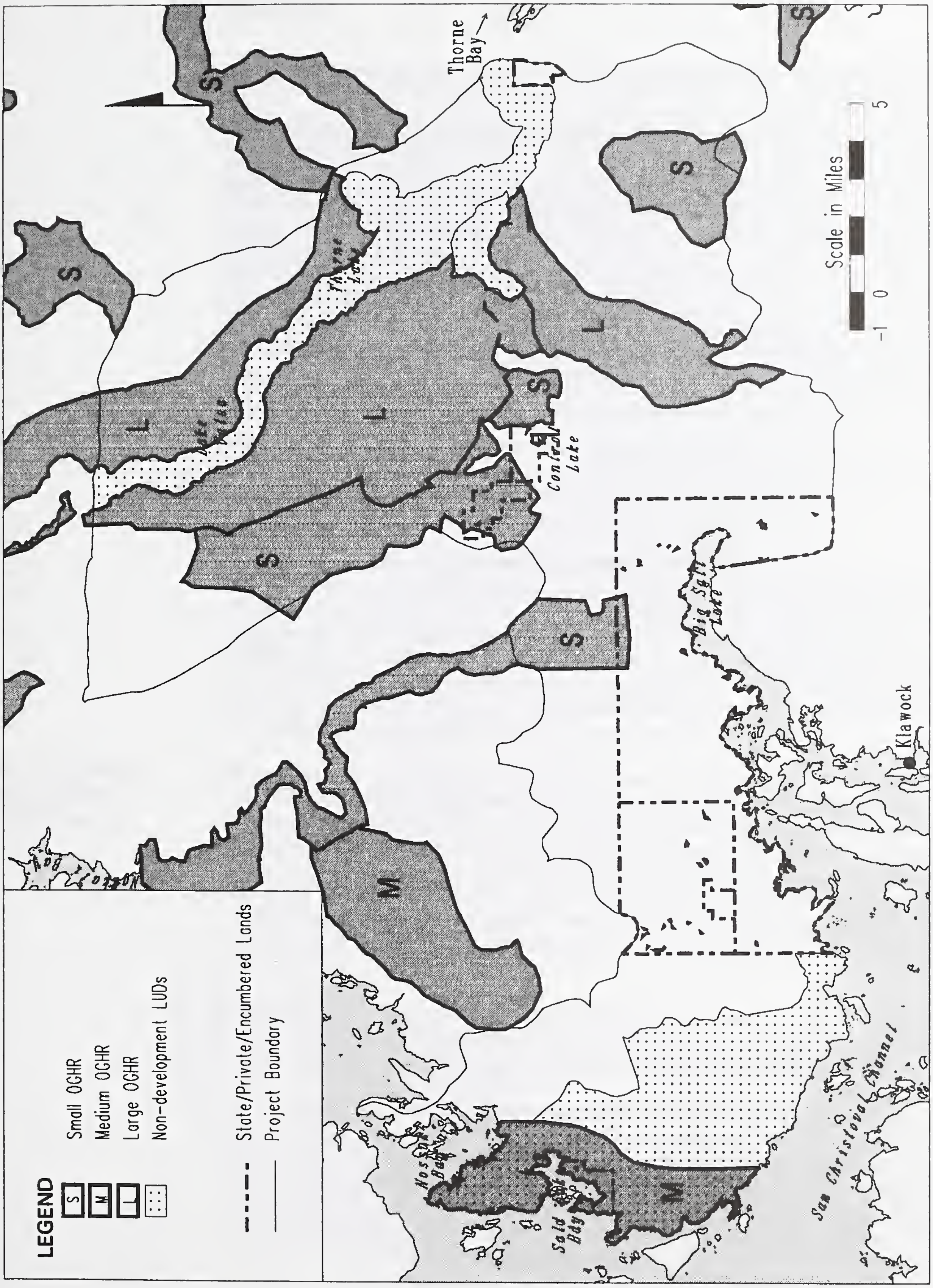
For the Tongass in general, and the Control Lake Project Area specifically, habitat needs for sustaining viable populations of individual species are addressed by guidelines for specific species or species groups. This is the "fine filter" approach to biological conservation. Forest Plan Standards and Guidelines relate to the "fine filter" and to management activities within the Matrix as discussed in Appendix N. These management activities are implemented on a stand level.

The more comprehensive portion of the strategy, which is applicable to the Control Lake Project Area, is the old-growth habitat strategy, in particular the old-growth habitat reserve network. Although beach and estuary fringes, Riparian Management Areas, high vulnerability karst, and other areas excluded from scheduled timber harvest contribute to the network, this landscape-level aspect of the strategy focuses on non-development LUDs, particularly Old-Growth Habitat Reserve (OGHR) LUDs.

Old-Growth Habitat Reserves are categorized as large, medium, or small reserves. Within the project area the Honker Reserve serves as a large OGHR, and the Logjam, Rush Peak, Steelhead, and Election Creek reserves serve as small OGHRs. In addition, the Western Peninsula Semi-Remote Recreation LUD serves as a medium OGHR in the strategy. Figure 3-10 illustrates the size and locations of the OGHRS and non-development LUDs.

Figure 3-10

Location of Old-growth Habitat Reserves and Non-development LUDs in the Control Lake Project Area



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Lands

Key Terms

Alaska Native Claims Settlement Act (ANCSA)—provides for the settlement of certain land claims of Alaska Natives.
Encumbrance—a claim, lien, charge, or liability attached to and binding real property.
Native selection—application by Native corporations to the USDI Bureau of Land Management for conveyance of a portion of lands withdrawn under ANCSA in fulfillment of Native entitlements established under ANCSA.
Special use permits—permits and granting of easements (excluding road permits and highway easements) authorizing the occupancy and use of land.
State selection—application by Alaska Department of Natural Resources to the Bureau of Land Management for conveyance of a portion of the 400,000-acre State entitlement from vacant and unappropriated National Forest System lands in Alaska, under the Alaska Statehood Act.

Introduction

Before 1971, the Ketchikan Area land base of the Tongass National Forest was fairly stable. There were only minor changes, such as the transfer of National Forest System lands to private homesites, canneries, and townsites. Beginning in the early 1970s, Federal legislation, including the ANSCA and the ANILCA, caused significant land ownership changes.

The Federal government owns the majority of the land in the Project Area (Figure 3-25); the Forest Service manages this land as part of the Tongass National Forest. The Forest Service administers 86 percent of the land within the Project Area, although there are areas owned by other entities. The State of Alaska owns or has selected less than 1 percent of the land. State lands are used for a variety of purposes. Approximately 10 percent of the land in the Project Area is privately owned, including land owned by the Sealaska Corporation. Sealaska land is used primarily for timber production. Timber management, recreation, subsistence, and fish/wildlife habitat are the primary National Forest use within the Project Area.

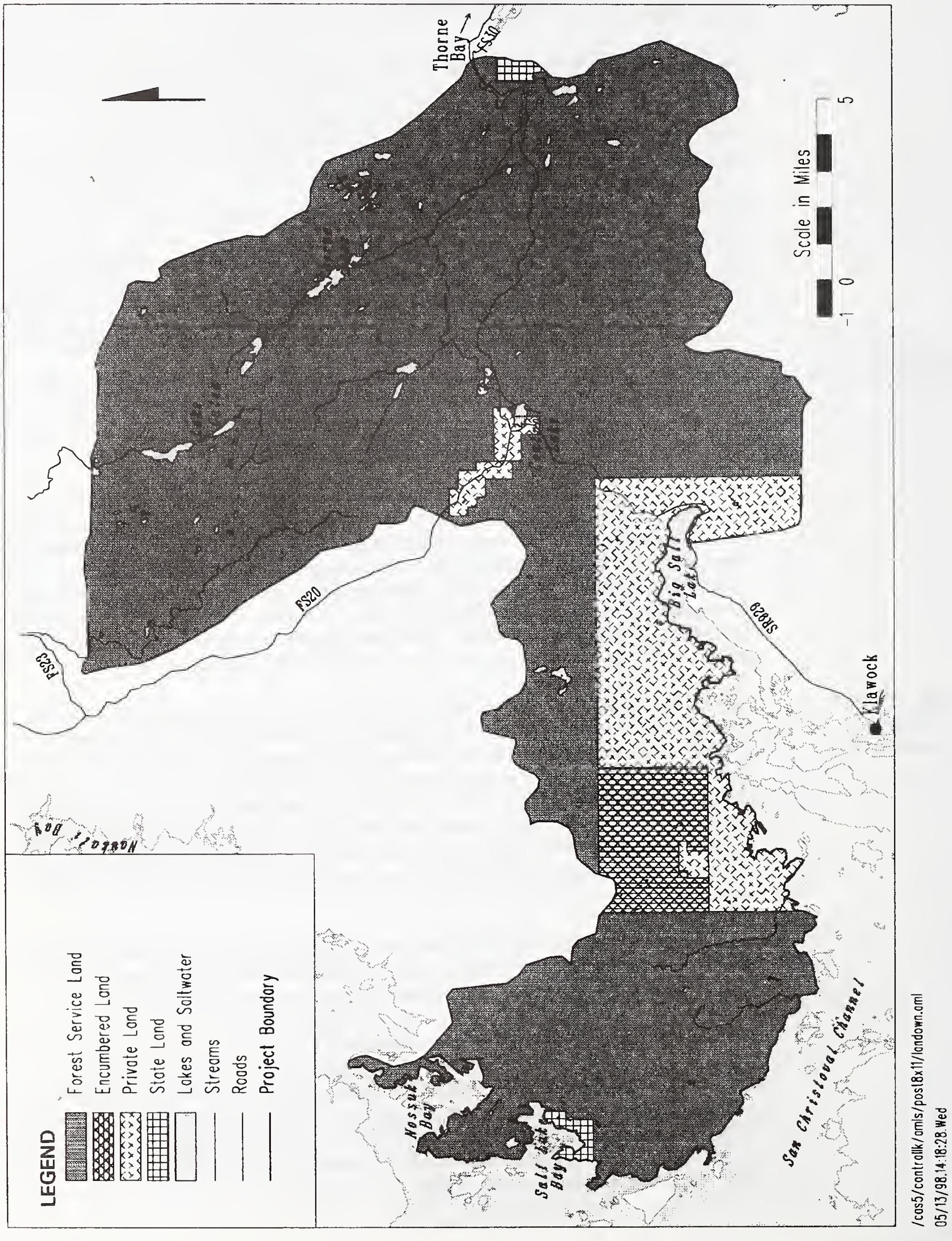
State and Native Lands, Claims, and Allotments

The Alaska Statehood Act of 1959 authorized the state of Alaska to select 400,000 acres of National Forest System lands in Alaska. To date, approximately 84 percent of the State's entitlement has been conveyed by the Bureau of Land Management. Most of the remaining land has been selected and is in the process of being conveyed. ANILCA gave the State until 1994 to complete its selections and permits the State to select lands in excess of its remaining entitlement. Because the State of Alaska can select more land than it is entitled to receive via conveyance, some of these lands might become available for National Forest harvest as the State removes lands from the selection list to get the total amount of land selected to 400,000 acres.

As illustrated in Figure 3-11, the State owns several parcels of land in the Project Area. State land is located at the south end of Big Salt Bay, on the west side of Control Lake, south of Kogish Mountain, west and north of Sealaska land, and northeast of Angel Lake.

ANCSA provided for conveyance of certain lands to the 10 Native village corporations, the two Native urban corporations, and the one Native regional corporation located in Southeast Alaska. These corporations are entitled to select approximately 550,000 acres of land from the Tongass National Forest. About 83 percent of these lands have been conveyed to the corporations. The U.S. Department of Interior and the Bureau of Land Management issued regulations authorizing these corporations to select lands in excess of their entitlement. However, as with State selections, only the actual entitlement will be conveyed.

Figure 3-11
Land Ownership/Management in the Project Area



In the Project Area, the Sealaska Corporation owns approximately 27,500 acres. The Sealaska land is located to the north, east, and south of Shinaku Inlet and Big Salt Lake. The land has been used primarily for timber harvest, and harvest activities continue today.

Overselected Lands in OGHRs

There are no overselected lands which could be conveyed into private ownership located in OGHRs in the Project Area.

Other Land Use Issues

Timber Management on Non-National Forest System Lands

National Forest System lands within and near the Project Area have been conveyed to both the Sealaska Native Corporation and the State of Alaska. Substantial timber harvest has occurred on these lands. If the rate of recent harvest activities continue, it could be assumed that much of the remaining timber on Native Corporation-owned land would be harvested in the near future.

Mining Claims

For information concerning mining claims in the Project Area, see the *Geology, Minerals, and Caves* section.

Special Use Permits

Recreational Special Use Permits in the Project Area are discussed in the *Recreation, Roadless Areas, Wild and Scenic Rivers, and Wilderness Areas* section. The only Nonrecreational Special Use Permit in the Project Area is for a lodge (the Boardwalk Wilderness Lodge) located near Thorne Bay.

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Transportation and Facilities

Key Terms

A-frame LTF—log transfer facility system which consists of a stationary mast with a falling boom for lifting logs from trucks to water. This system is generally located on a shot rock embankment with a vertical bulkhead to access deep water, accommodating operations at all tidal periods.
Access management—the designation of roads for differing levels of use by the public.
Aquatic Habitat Management Unit (AHMU)—mapping unit that displays an identified value for aquatic resources; a mechanism for carrying out aquatic resource management policy.
Arterial roads—roads usually developed and operated for long-term land and resource management purposes and constant service.
Endless chain LTF—log transfer facility system which consists of a gravity slide ramp for sliding log bundles into the water, with a chain assist system to slow the velocity of logs entering the water.
Collector roads—roads that collect traffic from Forest Local roads; usually connect to a Forest Arterial road or public highway.
Local roads—roads that provide access for a specific resource use activity such as a timber sale or recreational site; other minor uses may be served.
Log Transfer Facility (LTF)—a facility that is used for transferring commercially harvested logs to and from a vessel or log raft, or the formation of a log raft.
Main trunk roads—primary roads that are used repeatedly for forest access over a long period of time.
Maintenance levels—levels at which roads are maintained (or closed) for various uses, including high-clearance vehicle and passenger vehicle use. See Glossary for more detail.
Modular bridge—a portable bridge constructed of components that can be readily assembled and disassembled for movement from one site to another.
Specified roads—a road, including related transportation facilities and appurtenances, shown on the Sale Area Map and listed in the Timber Sale Contract. These roads are constructed as permanent roads as part of the forest development transportation system.
Temporary roads—short term roads built for limited resource activity or other project needs.
Traffic service levels—traffic characteristics and operating conditions that are used in setting road maintenance levels.

Transportation

Access to Prince of Wales Island and the Control Lake Project Area is by plane, ferry, and boat. A ferry terminal for the State of Alaska Marine Highway System is located at Hollis south of the Project Area. A newly developed Inter-Island Ferry Authority is working to bring an alternative private ferry service connecting Coffman Cove and Wrangell/Petersburg. The road network on Prince of Wales Island originally developed as a result of timber harvest starting in the mid-1950s. Forest Road 30 leads west from Thorne Bay to the Control Lake junction. The road extends south to Klawock and Craig and north to Naukati. Roads extend from Forest Road 30 into the Rio Beaver Watershed and into the Honker Divide area. South of the Control Lake junction the road system enters the Steelhead Creek drainage. Private roads accessing private land extend off this road system west along Big Salt Bay. On the western part of the Project Area the road system extends south from the Staney Creek watershed into the northern portion of the Western Peninsula.

Currently, timber harvested from National Forest System lands on the north or western part of the Project Area is hauled to Coffman Cove, Naukati, or Winter Harbor. Timber harvested in the central Project Area is transported to Thorne Bay. Opportunities to use private road systems that touch the Project Area exist through a user fee agreement. Specifically, the private road system along Big Salt Bay provides access to the Shinaku Area.

The Forest Transportation System includes three types of roads: arterials, collectors, and locals. Arterial and some collector roads are usually maintained for use by passenger vehicles and are normally designed for higher truck speeds than local roads. Forest Road 30 is considered an arterial while the main branches from it are collectors. Local roads provide access to individual harvest units and recreation sites.

Table 3-16 shows the total miles of road and road density and the open roads and road density by WAA for the Project Area (Figure 3-9). Road density is calculated by dividing the miles of road by the total area in square miles of the WAA. There are 210 miles of road within the Project Area. Road density averages 0.68 mile per square mile across the Project Area. Open road density averages 0.57 mile per square mile within the Project Area. Closed roads exist in the Thorne, Cutthroat, and Rio Beaver watersheds. No roads exist in the Rio Roberts Watershed, in a large part of the central Honker Divide area, and on most of the Western Peninsula.

Table 3-16
Existing Roads and Road Density for the Control Lake Project Area

WAA	Existing Roads (Miles)	Existing Road Density (mi/mi^2)	Existing Open Roads (Miles)	Existing Open Road Density (mi/mi^2)
1318	67.5	0.78	67.5	0.78
1319	110.8	0.91	76.8	0.63
1323	14.0	0.23	14.0	0.23
1421	18.1	0.39	18.1	0.39
Total	210.3	0.68	176.4	0.57

Source: USDA Forest Service, Ketchikan Area GIS Database.

Access Management

The Thorne Bay Ranger District has an active access management program. This program includes public involvement and interagency evaluation of road management objectives. Objectives of this program include balancing the need for access by the public and for silvicultural activities with wildlife disturbance and water quality objectives. Chapter 4 includes a description of maintenance levels, access management categories, and access prescriptions for each road in the project.

Logging Camps

There are no logging camps in the Control Lake Project Area.

Forest Service Facilities

There are no Forest Service administrative sites in the Project Area. The Thorne Bay Ranger Station is located a few miles outside the eastern Project Area Boundary.

Log Transfer Facilities

The transfer of harvested timber requires that logs be removed from trucks, placed in salt water, and rafted or barged to their destination. There are no LTFs in the Control Lake Project Area. LTFs adjacent to the Project Area are located at Winter Harbor, Naukati, and Klawock. These LTFs operate under existing permits. The LTF in Klawock is privately owned and is available for use on a fee basis. Although an LTF also exists at Thorne Bay, the A-frame LTF is being removed and cleared up as part of the KPC Long-term Contract Settlement Agreement.

Economic and Social Environment

Key Terms

Cant—a log partly or wholly cut and destined for further processing.
Discounted benefits—the sum of all benefits derived from the Project Area over the life of a project.
Discounted costs—the sum of all costs incurred from the Project Area during the life of the project.
Present Net Value (PNV)—the difference between total discounted benefits and total discounted costs associated with the alternatives calculated at a 4 percent discount rate.
Discount rate—the rate used to adjust future benefits or costs to their present value.

Nearly 80 percent of Southeast Alaska is within the Tongass National Forest, an area larger than the state of West Virginia. This area stretches roughly 500 miles from Ketchikan in the southeast to Yakutat in the northwest, and is mainly unpopulated wild country. Approximately 65,000 people live in 33 towns, communities, and villages located in or near the boundaries of this, the largest forest in the National Forest System.

The economies of most communities in Southeast Alaska depend almost exclusively on the Tongass National Forest to provide natural resources for uses such as fishing, tourism, recreation, timber harvesting, mining, and subsistence. There is very little private land to provide these resources. Consequently, maintaining the abundant natural resources found on the Tongass concerns those who make their living there.

In addition to its economic value, the importance of the Tongass lies in its general enhancement of the quality of life. Southeast Alaska is regarded as a wild and magnificent place, a vast expanse of seemingly limitless scenery and abundant natural resources. Many Southeast Alaskans want to preserve their local environment while maintaining their economic livelihood. With a limited resource base, resolution of this conflict is becoming increasingly difficult. The TLMP (1997) provides the most recent effort to reach resolution.

The TLMP (1997) Final EIS includes a comprehensive analysis of the economic and social environment for Southeast Alaska, the Tongass National Forest, and the communities within these areas. The scope of the economic and social analysis has to be broader than just the Control Lake Project Area; thus, the TLMP (1997) analysis and documentation found in its Final EIS are most applicable. Included in the TLMP (1997) Final EIS (Volume 2) pages 3-431 to 3-685 and Appendix H are discussions of various aspects of the economy, timber industry, fishing industry, recreation and tourism industry, demographics, and information pertinent to each community in the region. This information is incorporated by reference.

Chapter 4 of this EIS displays a summary of timber sales and other related information that could contribute to the economic and social environment of the region from the Control Lake timber sales.

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Subsistence

Key Terms

Alaska National Interest Lands Conservation Act (ANILCA)—requires evaluations of subsistence impacts before changing the use of certain Federal lands.
Birds—includes ducks (e.g., mallards, widgeons, teals, shovelers, old squaws, golden eyes, and buffaloheads), seabirds and seaducks (e.g., scoters, murres, murrelets, puffins, seagulls, and cormorants), Canada geese, seabird eggs, and other birds.
Invertebrates or shellfish—includes king crab, dungeness crab, tanner crab, shrimp, sea cucumber, sea urchins, abalone, octopus, scallops, gumboot, clams and cockles, other invertebrates, and herring eggs.
Land mammals—includes deer, moose, mountain goat, black bear, wolf, small game, and furbearers (i.e., marten and land otter).
Marine mammals—harbor seal and other marine mammals.
Nonrural—a community with more than 7,000 people; does not qualify for priority use of subsistence resources. Juneau and Ketchikan are the only two communities in Southeast Alaska which have been determined to be nonrural by the Federal Subsistence Board.
Finfish or fish—includes cod, halibut, flounder, sole, flatfish, rock fish, herring, eulachon, hooligan, Dolly Varden, steelhead, trout, and other fish (excluding salmon).
Plants—includes beach greens, mushrooms, roots, seaweed/kelp, and berries.
Rural—all Southeast Alaska communities other than Juneau and Ketchikan; residents qualify for priority use of subsistence resources.
Salmon—includes king, sockeye (reds), coho, pink (humpback), and chum (dog).
Subsistence—customary and traditional uses by rural Alaskans of wild renewable resources.
Wildlife Analysis Area (WAA)—a division of land designated by ADF&G and used by the Forest Service for wildlife analysis.

Introduction

Congress acknowledged the importance of subsistence activities to the rural communities of Alaska with the passage of the ANILCA in 1980. Section 803 defines "subsistence uses" as:

> . . .the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing or family consumption; and for customary trade.

ANILCA does not define "customary and traditional," but the definition has been extensively developed administratively as part of the implementation of ANILCA. Section 804 further stipulates the Federal obligation to provide for subsistence activities as a priority consumptive use.

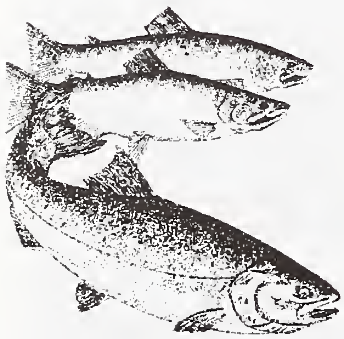
ANILCA provides for "the continuation of the opportunity for subsistence uses by rural residents of Alaska, including both Natives and non-Natives, on the public lands" (Section 801 (1)). It also legislates that "nonwasteful subsistence uses of fish and wildlife and other renewable resources shall be the priority consumptive uses of all such resources on the public lands of Alaska" (Section 802 (2)).

3 Affected Environment

Effective July 1, 1990, the Federal government took over the management of subsistence use of fish and wildlife resources on Federal public lands. The Federal Subsistence Board regulates this management. Alaska residents of rural areas or rural communities receive priority in the taking of fish and wildlife on public lands for subsistence uses. In Southeast Alaska, the Federal Subsistence Board has declared only Juneau and Ketchikan nonrural.

Subsistence Overview

Subsistence activities are allowed under all management prescriptions under the Forest Plan (TLMP 1997), subject to Federal and State regulations. There is no single management prescription designed to protect or maximize subsistence activities. Rather, subsistence activities have been given a more general priority under Title 8 of ANILCA. The Forest Service's forestwide standards and guidelines for subsistence resources are derived directly from ANILCA Title 8.



Nearly a third of rural households in Southeast Alaska get at least 50 percent of their meat and fish from hunting and fishing (Kruse and Muth, 1990). Categories of subsistence resources used in Southeast Alaska, with the percentage of the total edible regional harvest by weight they comprise, are deer (21 percent), salmon (21 percent), other finfish (24 percent), invertebrates (16 percent), land mammals other than deer (4 percent), marine mammals (3 percent), plants (3 percent), and birds (negligible) (Kruse and Muth, 1990). These percentages are representative of those communities included in this EIS. Subsistence cannot be reduced to or discussed solely in terms of economic factors, however. Even for households that could afford to purchase all their food, harvesting subsistence resources in an important cultural activity, reflecting deeply held attitudes, values, and beliefs. Thus, even though this EIS concentrates on the potential effects of the proposed actions on the harvest of subsistence resources, it does so because currently this is the best indicator of the potential effects of the proposed actions upon the entire subsistence complex. It is also the aspect of the subsistence complex addressed most directly by ANILCA.

The management of subsistence fishing is currently in flux and is quite complex, but as the effects of the proposed actions will have minimal effect upon fish resources, these effects are not analyzed in as much detail. In summary, for Federal purposes, all Alaskan residents of all of the communities to be discussed in this EIS, except for Ketchikan, are treated the same in terms of classification as "subsistence" hunters.

Tongass Resource Use Cooperative Survey

In 1988, a detailed subsistence resource and use inventory of the Tongass National Forest (Tongass Resource Use Cooperative Survey [TRUCS]) was started as a part of the TLMP revision. The TRUCS of 1988 was directed by the University of Alaska's Institute of Social and Economic Research (ISER), in conjunction with the Forest Service and the Division of Subsistence of the ADF&G (Kruse et al., 1988).

Researchers went to over 30 communities in Southeast Alaska and conducted interviews with randomly selected households about their 1987 subsistence activities and uses. All TRUCS results and conclusions are based on a sample of households; thus, the actual amounts harvested by the study communities could differ from that reported by the sample households. Kruse et al. (1988) contains a detailed description of the survey. GIS maps of subsistence use areas from the TRUCS are presented later in this section.

The Control Lake Project Team used TRUCS data, in conjunction with ADF&G harvest information and other secondary sources, to determine which communities potentially would be affected by the proposed actions and thus should be included in this analysis. Galginaitis (1994) discusses this process in some detail, which resulted in the selection of 11 study communities for this project: Coffman Cove, Craig, Hollis, Hydaburg, Ketchikan, Klawock, Metlakatla, Naukati, Saxman, Thorne Bay, and Whale Pass.

Control Lake Subsistence Interviews

Overview of Interview Results

The Project Team conducted a limited number of personal interviews in each of the study communities to supplement existing information (TRUCS, harvest statistics, other secondary sources). These concentrated on filling in data gaps and verifying whether the somewhat dated TRUCS data was still applicable. The objective of this field work was not to obtain information from a statistically representative sample from each community, which was beyond the scope of this project. Rather, it was to elicit information from some of the most active subsistence harvesters in each community to establish the type and range of subsistence activities involved in that community's pattern of use. This information was then used to reinforce or modify the description of community use developed from previous information. While this information cannot be used to make statistical comparisons with TRUCS results, it provides a rich and reliable qualitative supplement.

The team conducted a total of 107 individual interviews; the vast majority concerned primarily the use of subsistence resources. In addition, the Project Team held a number of collective discussions about community subsistence use of the Project Area and potential effects upon this use in Klawock, where there is considerable local interest. The methodology of this work is only summarized here. More detail can be found in Galginaitis (1994).

The field effort concentrated in those communities presumed to be potentially more affected by the proposed action and/or those communities that were poorly documented in existing records. Community population size also was considered. Six communities accounted for the bulk of the field effort: Ketchikan (19 interviews), Klawock (17), Hydaburg (14), Craig (12), Thorne Bay (11), and Naukati (9).

A protocol outlining the information sought and the topics to discuss guided the interviews. Interviewers asked residents about their personal and household use of land and sea mammals, finfish, shellfish, birds, plants, and other subsistence resources. Areas of use and access to those areas were specifically elicited, as were opinions about the potential effects of the proposed actions on that use. The interviewers invited respondents to discuss recreational use of subsistence resources as activities supplementary to, competitive with, or both, to subsistence activities. The field study also collected demographic, employment, and other descriptive information. The discussion below summarizes the results of these interviews. More detail can be found in Galginaitis (1994).

Affected Communities

The following discussion provides a brief description of subsistence resource use patterns for each of the study communities based on the interviews. Summary community harvest tables are included in Galginaitis (1994). The areas used for subsistence deer hunting by less than 1, 1 to 5, 5 to 15, and greater than 15 percent of the households in each affected community are presented in Figures 3-27 through 3-32. A WAA map is provided in Figure 3-9 in the Wildlife section. Table 3-17 summarizes the characteristics of the Prince of Wales Island communities included in the Control Lake Subsistence Analysis.

Table 3-17
Prince of Wales Island Study Communities

Place	Pop. (ADOL 1995)	Native/Non-Native (%)	TRUCS Sample (X of Y HHs)	Vacancy Rate	Subsistence Harvest (lb/per capita, total harvest)	Subsistence Dependence (meat) (%)
Whale Pass	92	4/96	18 of 18	51	186 9000	43
Hollis	106	4/96	29 of 32 91%	52	164 13,000	42
Hydaburg	406	11/89	35 of 110 32%	15	337 128,000	37
Coffman Cove	254	7/93	41 of 66 62%	14	186 35,000	25
Saxman	394	78/22	36 of 76 47%	28	90 23,000	21
Thorne Bay	650	3/97	52 of 156 33%	31	188 90,000	37
Klawock	759	45/55	52 of 224 23%	15	239 186,000	36
Craig	1,946	25/75	64 of 365 18%	6	189 219,000	25
Naukati	147	1/99				
Ketchikan	15,082	15/85T				

Source: USDA Forest Service, 1991a; Kruse and Muth, 1990; Kruse and Frazier, 1988; USDC, 1992; ADOL, 1995; TLMP, 1997.

A wide variety of subsistence activities takes place within the Control Lake Project Area. Table 3-18 shows the per capita pounds of edible subsistence harvest by type for communities using the Project Area. This is based on the total community harvest from all areas used, not just from the Project Area. This table shows that marine resources are important consumption resources. The State rather than the Federal government has managerial responsibility for most of those resources at present. Freshwater fish make up only a small part of this overall harvest, although a navigable waters dispute could conceivably affect small salmon streams in the future. For this EIS, however, the extent to which the proposed actions may affect these species is treated in *Wildlife* (Section 3.7) and Confer (1994).

Table 3-18
Per Capita Subsistence Harvest (Edible Pounds for Rural Communities, 1987)

Community	Deer	Other Mammal	Salmon	Finfish/Marine Invert.	Other	Total
Coffman Cove	59.6	0	51.8	67.5	6.8	185.7
Craig	40.6	3.2	40.4	88.6	12.1	185.0
Hollis	37.9	8.7	44.4	63.0	9.9	163.9
Hydaburg	42.8	0.6	137.4	135.8	20.4	337.1
Juneau	NA	NA	NA	NA	NA	NA
Ketchikan	NA	NA	NA	NA	NA	NA
Klawock	34.5	1.2	69.4	85.8	32.6	223.3
Metlakatla	10.6	0.2	20.3	32.5	7.2	70.8
Naukati Camp	NA	NA	NA	NA	NA	NA
Petersburg	43.9	18.9	45.3	79.4	12.8	200.3
Saxman	16.6	5.4	33.2	27.9	6.3	89.3
Thorne Bay	36.7	5.9	47.9	92.8	4.5	187.7
Whale Pass	50.2	16.5	41.1	71.8	6.6	186.1
Wrangell	20.4	16.9	30.2	84.2	12.4	164.2

Source: ADF&G Community Profile Database Catalog, Volume 1: Southeast Region.

Deer is the only terrestrial species with an important consumptive use in the local diet. Still, a wide variety of plant and animal resources, especially for the western part of the Project Area, are important for people from Klawock and Craig. Residents of other communities did not mention as many other resources, although black bear and furbearers are animals that are harvested (Galginaitis, 1994).

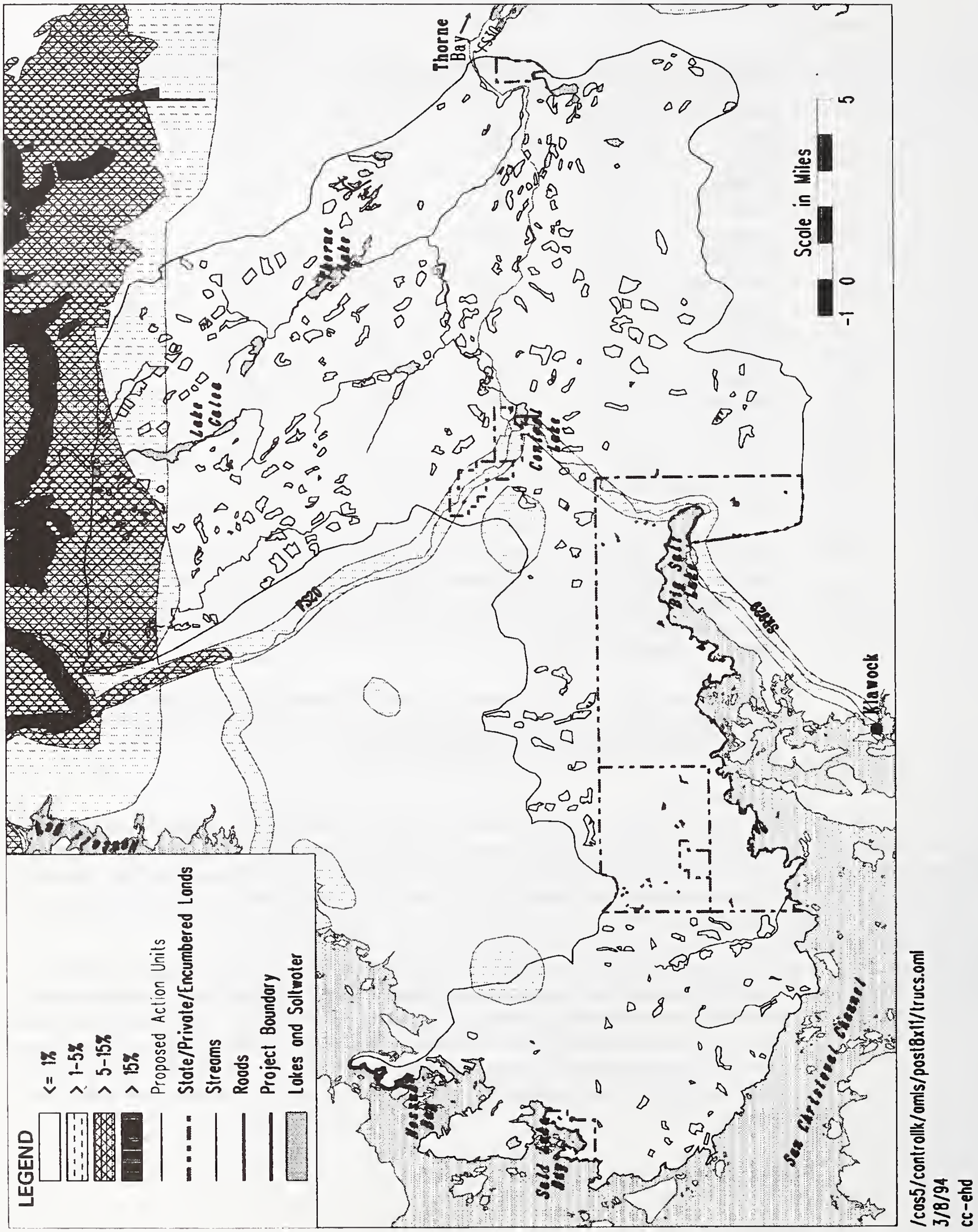
Based on their perceived level of importance and the potential for project effects, fish and wildlife (especially deer) are the subsistence resources of most concern in this EIS. However, other resources are considered in separate subsections.

Coffman Cove

Local hunters report that most Coffman Cove residents hunt in the immediate vicinity of the community and rely heavily on road access. They also say that many nonlocal hunters use Coffman Cove's local hunting area. The ADF&G hunter survey data support these statements. Coffman Cove residents took 60 to 88 percent of their deer from the two WAAs closest to the community—WAAs 1420 and 1421.

The portions of WAA 1421 in the Project Area are the only part of the area potentially harvested by Coffman Cove hunters to any significant extent. Coffman Cove hunters have taken about 37 percent of their documented deer harvest from WAA 1421. The TRUCS map (Figure 3-12) for areas ever hunted for deer by Coffman Cove residents within the Control Lake Project Area underscores the general description of Coffman Cove use patterns (close to the community, road-oriented), and indicates that relatively little use occurred in those parts within the Project Area.

Figure 3-12
Coffman Cove TRUCS Map (Areas Ever Hunted for Deer—Percent of Households)



Craig

While there was aboriginal use of the Craig area for fish camps and settlement sites in the area (most notably at Klawock), the present permanent community of Craig dates from the salmon packing operation started in 1907 on Fish Egg Island, just northwest of the present location of Craig. While Natives comprise a significant portion of the population, Craig as a community has a relatively short time depth and a predominantly non-Native organization. This is in sharp contrast with the community of Klawock; however, some residents of Craig are quite similar to those of Klawock in their patterns of subsistence resource use.

Hunters from Craig use all four WAAs comprising the Control Lake Project Area. Since Craig is located within WAA 1318, this WAA is clearly the most significant in terms of its community harvest (about 31 percent). The other Project Area WAAs each provide 5 to 8 percent of the community's overall deer harvest. Craig takes more than 10 percent of the total deer harvested from each of the Project Area WAAs, with WAA 1323 (29 percent) and WAA 1318 (50 percent) being the most significant.

Craig hunters report using both boats and road vehicles for access to deer hunting areas. Figure 3-13 shows that Craig hunters use all portions of the Project Area accessible either by boat (and hiking) or by road (and hiking). There is some indication that boat-based hunters are willing to hike farther than road-based hunters. Respondents do not report using the relatively unroaded portions of WAA 1319, otherwise accessible by road, whereas they do report using all of WAA 1323, which is almost totally unroaded but accessible by boat. Overall, Craig hunters report using road corridors most heavily.

Hollis

Hollis deer hunters prefer to hunt their local area. Hollis residents hunt in the Control Lake Project Area, but only at a relatively low level. The TRUCS map (Figure 3-14) indicates that those portions of WAAs 1318 and 1421 used by Hollis hunters are, for the most, part outside of the Project Area.

Hydaburg

The documented deer harvest for Hydaburg shows that the Project Area contributes about 18 percent of the community's total deer harvest. This harvest is fairly evenly spread over all four Project Area WAAs. The TRUCS map for Hydaburg (Figure 3-15) shows that all of Prince of Wales Island, and much of other parts of Southeast Alaska, are equally important for deer hunting. Project field interviews support the conclusion that Hydaburg hunters use the Project Area only in a very limited way, and generally stay south of the Project Area.

To some degree, all Hydaburg households rely on subsistence resources for daily food. Hydaburg residents share substantial amounts of subsistence foods with friends and relatives in other communities. A portion of these resources are probably taken from the Project Area. However, little good information exists on the amount of such sharing and the area of origin of the resources shared.

Ketchikan

The off-island community with the largest reported harvest in the Project Area is Ketchikan located on nearby Revillagigedo Island. Ketchikan also differs from the other communities reviewed in this analysis based on its status under Federal subsistence law as an "urban" (non-subsistence) community. Since Ketchikan residents are not subsistence hunters by definition, harvest composition information comparable to that for rural communities is not available.

Figure 3-13
Craig TRUCS Map (Areas Ever Hunted for Deer—Percent of Households)

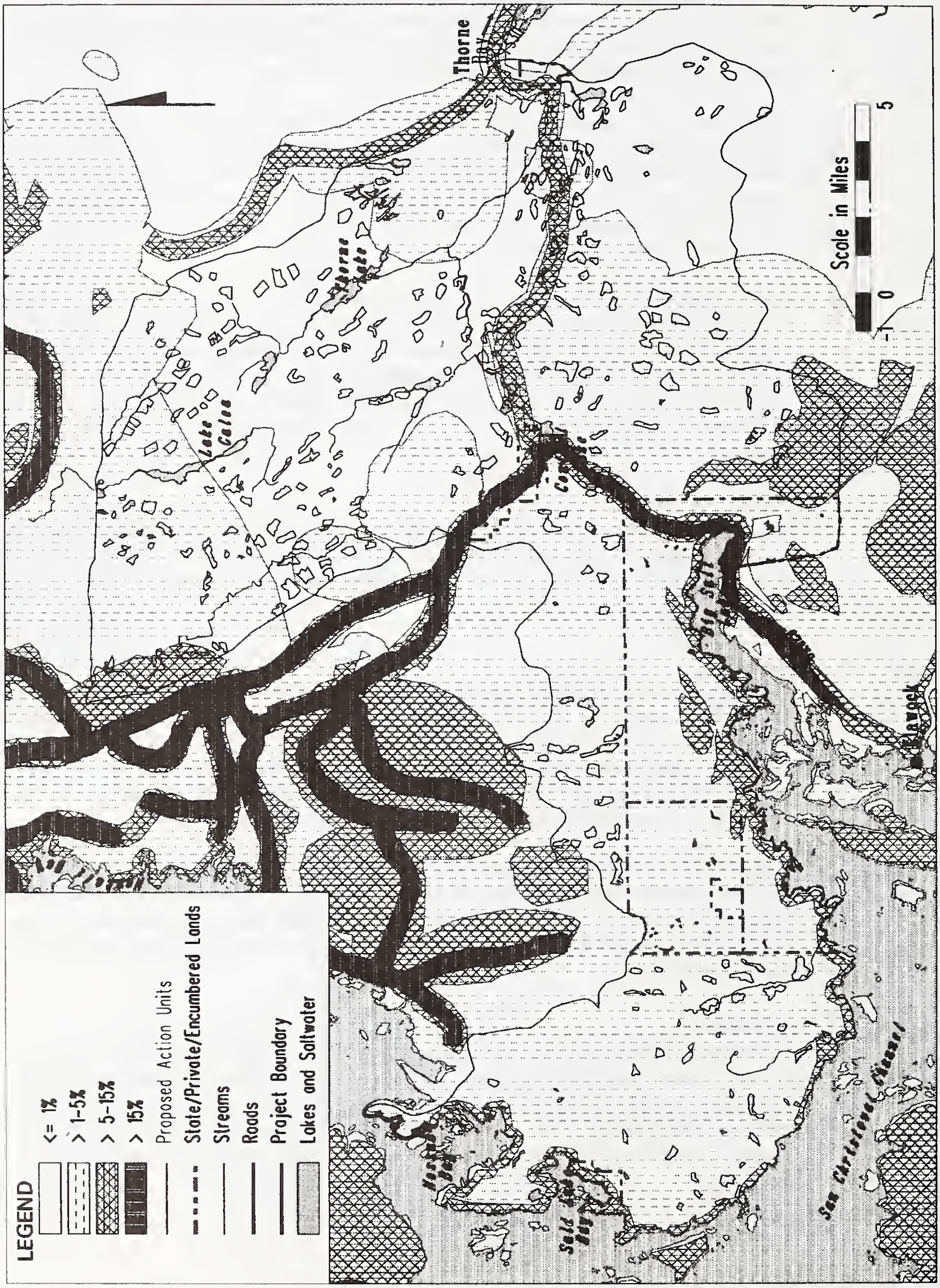


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Figure 3-14
Hollis TRUCS Map (Areas Ever Hunted for Deer—Percent of Households)

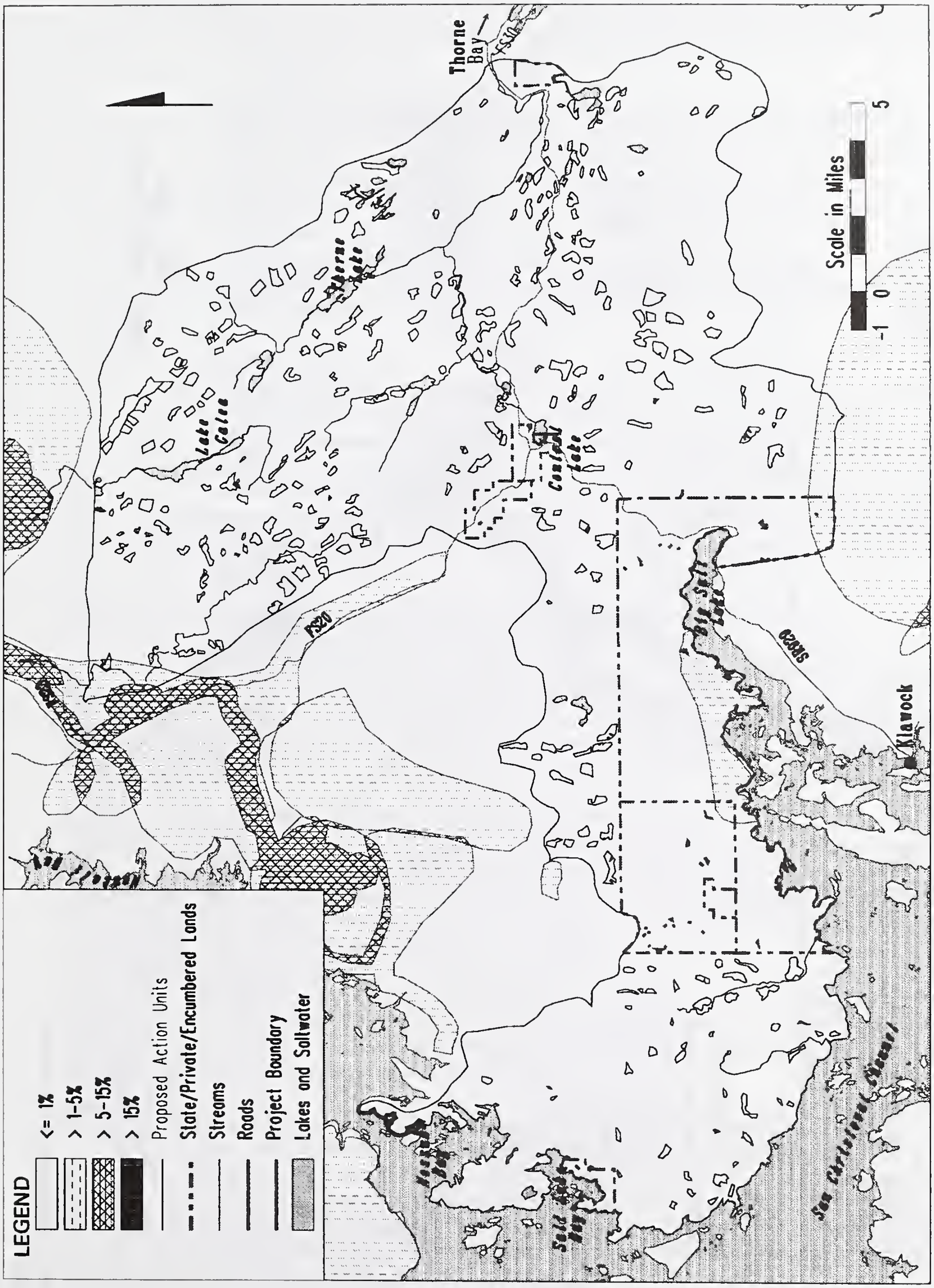
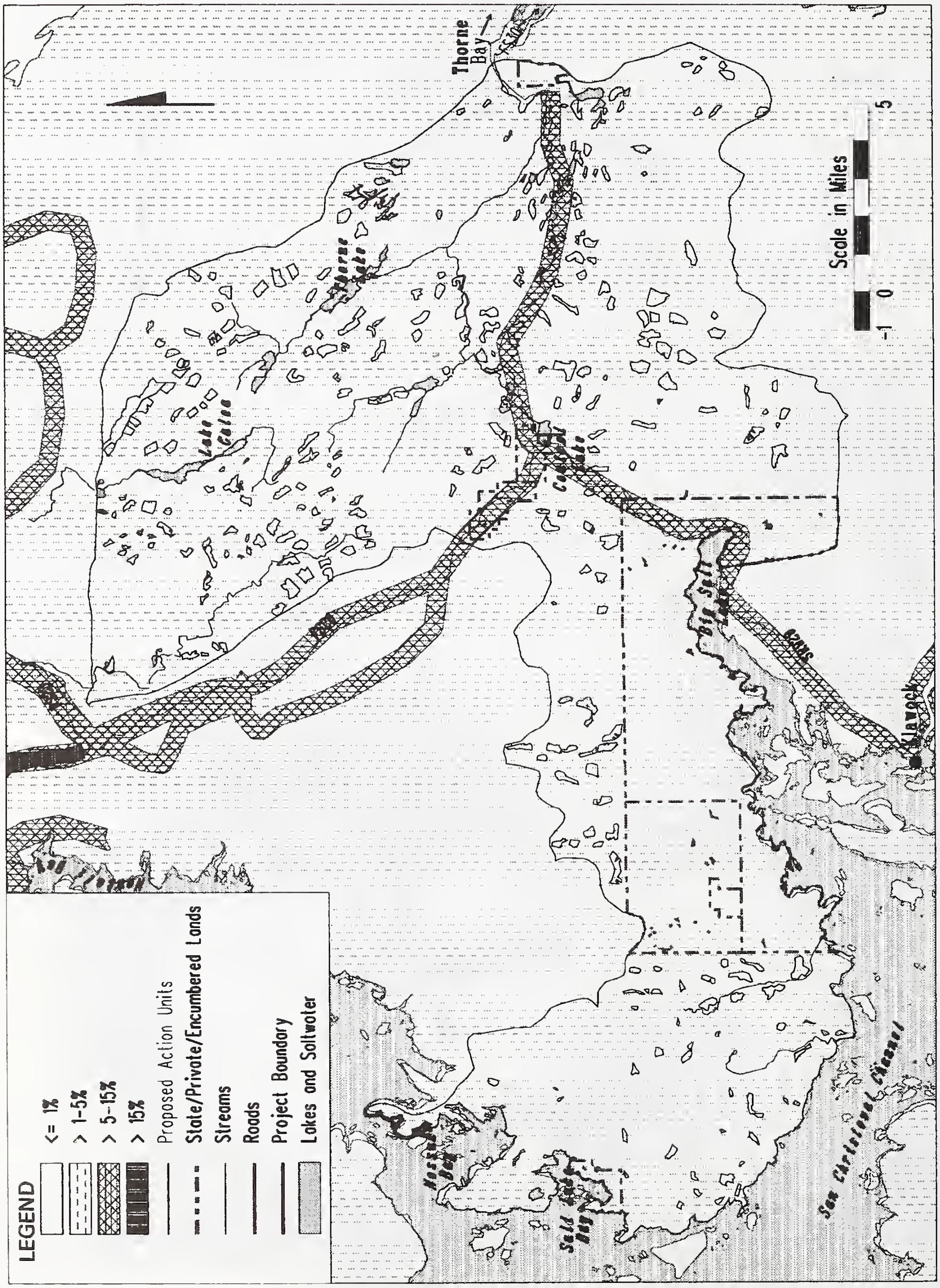


Figure 3-15
Hydaburg TRUCS Map (Areas Ever Hunted for Deer—Percent of Households)



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hg-ehd

Ketchikan reportedly takes well over half (57 percent) of its total community deer harvest from GMU 2, and 14 percent of its total community deer harvest comes specifically from the Control Lake Project Area. Ketchikan takes an average of 21 percent of all deer reported harvested from the Project Area (and Ketchikan hunters account for 30 percent of all deer taken from GMU 2 as a whole). Ketchikan hunters take from 7 to 45 percent of the total deer harvested in the four WAAs.

Clearly, Ketchikan hunters compete with subsistence hunters within the Project Area WAAs. Ketchikan hunters harvesting deer on Prince of Wales Island, and especially within the Project Area, are overwhelmingly road-oriented hunters entering the Project Area via the road network's ferry access at Hollis. But, Ketchikan hunters are not exclusively dependent upon direct road access to hunt deer; they take 24 percent of the total deer harvested in WAA 1323, which has little road access (primarily from the north, which is a well-roaded area heavily used by Ketchikan hunters). Any further roading of this area would potentially increase its use by Ketchikan hunters, thus increasing competition for the "boat" hunters from other communities who use this area.

Klawock

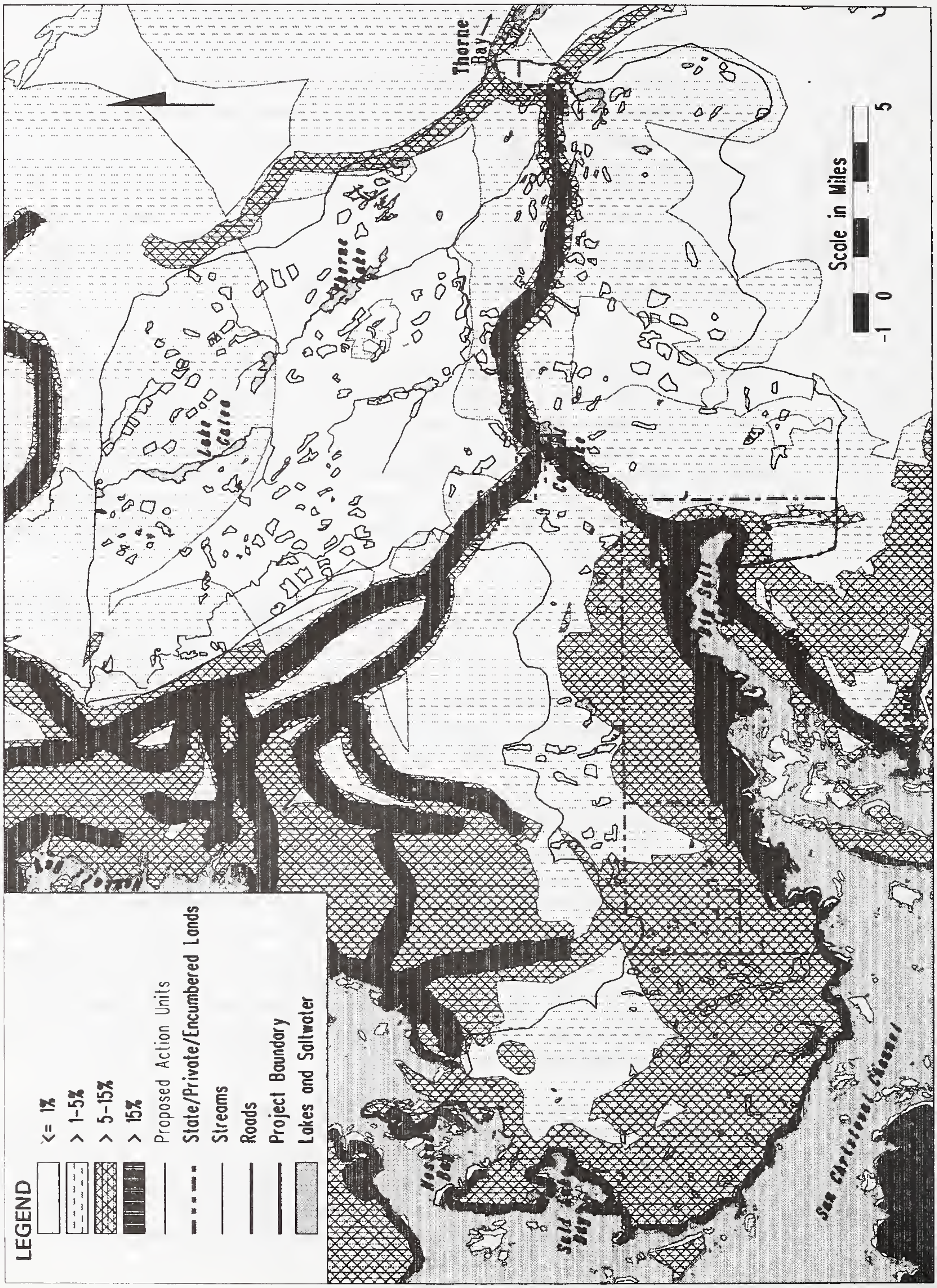
Because of its identity as a Native community, Klawock has an historical relationship with the subsistence resources of the area. Ellanna and Sherrod (1987) provide an historical discussion of Klawock territorial subsistence patterns, although the details are not always clear. They argue that the earlier (and more predominantly Tlingit) population of Klawock was more seasonally mobile and exploited a larger territory than has the Klawock population of 1970 to the present. In other words, the current population of Klawock is more dependent upon their local area, which includes the Control Lake Project Area, than were residents of Klawock in the past.

Ellanna and Sherrod also note that as recently as 1982, 67 percent of Klawock hunters harvested deer exclusively from boats, whereas in 1984 this figure fell to only 9 percent. Hunters exclusively using cars or trucks went from 5 percent in 1982 to 62 percent in 1984. Thus, by 1984, the Klawock deer harvest pattern had switched from coastal-skiff to interior-road (Ellanna and Sherrod, 1987) as a result of the access provided by logging roads and the competition for resources closer to the village. Close to 70 percent of Klawock residents used roads as their primary means of access to deer by 1984, basically in a northern direction.

The ADF&G hunter survey information for 1988 to 1991 and the TRUCS map (Figure 3-16) demonstrate this pattern. Klawock residents use the Project Area on a regular basis; they use WAA 1318 very heavily and all but WAA 1421 relatively heavily. Klawock hunters harvest more deer from areas close the community than from those farther away. The WAAs immediately around Klawock (WAA 1318 and WAA 1323) appear to be predominately coastal hunting areas, where skiffs are used for access. Interviews in Klawock with local hunters indicate that they perceive these areas as important because of their boat access. While portions of this area are accessible by road, and are hunted in that manner, the character of the area is based on hunting from boats. Over 50 percent of the community's deer harvest can come from these two WAAs, but the importance local hunters attribute to this area, and especially WAA 1323, goes far beyond the actual resources harvested.

Klawock hunters repeatedly stressed that WAA 1323, which they referred to as the Elevenmile area, was where they had been taught to hunt by their fathers and grandfathers, and was where they wanted to teach their own children to hunt. They did not want the character of the area to change. The greatest value to them is being able to experience the hunt, and the land, in the same way as their ancestors. They believe any timber harvest activity or road construction in WAA 1323 will harm their present use of this area. Furthermore, they frequently mentioned

Figure 3-16
Klawock TRUCS Map (Areas Ever Hunted for Deer—Percent of Households)



this western part of the Project Area as important for other subsistence resources—seaweed, seals, various sorts of invertebrate seafood, and fish. No other part of the Project Area was characterized as such a multiuse area.

Naukati

The subsistence resource use patterns for Naukati have not been well documented, since it was not included in the TRUCS. Most of the following description is based on limited Project field work in the community, supplemented by a discussion of the available ADF&G harvest statistics.

As with other communities in the Project Area, fishing is very important to the residents of Naukati. While interviewees did not quantify the amount of fish caught per household, or compare it to the amount of deer harvested, fish are probably at least as important as deer in terms of edible harvest. Most deer hunting out of Naukati is done in the immediate vicinity of the community or to the south toward Winter Harbor. Most Naukati hunters reportedly do not go more than a mile or so north of the community. A few do report hunting the Control Lake Project Area at times. Although hunting near the roads is productive, and almost all Naukati hunters use the roads to access good hunting areas, a fair number of local hunters are "bush beaters," that is, they prefer to hunt off the roads. Many people also hunt the valleys and spur roads.

ADF&G harvest statistics support the pattern described by local informants. The Project Area is little used, with almost all Naukati deer taken from the WAAs immediately surrounding the community. There is limited road access to WAA 1323 from the north (the Naukati area), but Naukati residents also mention using boats to hunt the coast.

Thorne Bay

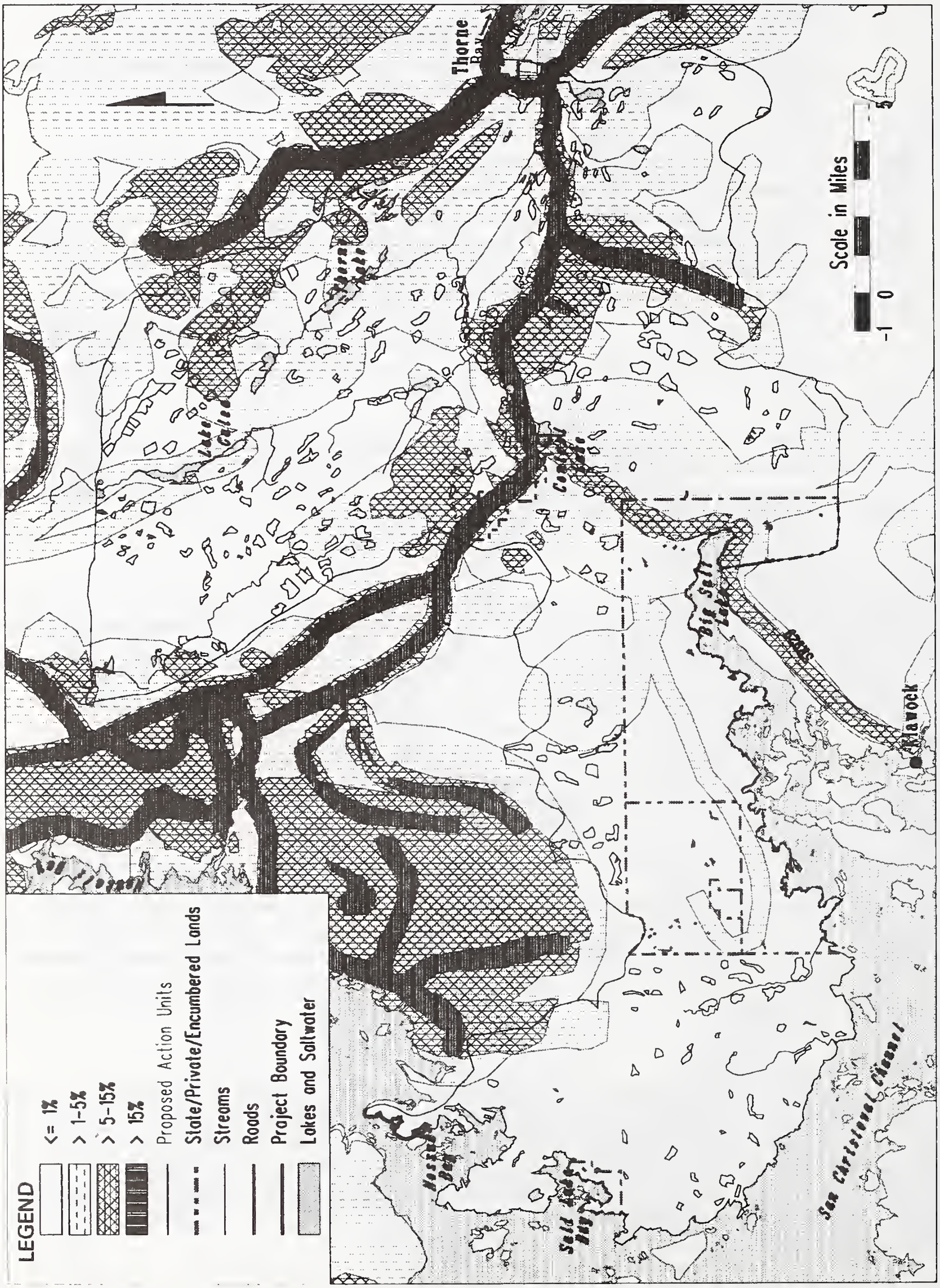
Mapped subsistence use information for Thorne Bay has not been updated since 1987. ADF&G harvest statistics and the limited project field work confirm the TRUCS description that Thorne Bay hunters use mostly those areas closest to the community, and use both boats and road vehicles for access. For areas farther from the community, road access is by far the most important. They also use alpine areas and other areas considerable distances from roads; but, most hunters prefer to minimize packing effort and time by confining themselves to near-road hunting. This hunting effort is almost totally local, and is clearly related to Thorne Bay's historic location at the end of one branch of the road network. Most of Thorne Bay's deer are taken in the two WAAs of the Thorne Bay road network (1315, 1319), the WAA to the north which contains the main 20 Road and the Naukati road network (1422), and the two WAAs of the Coffman Cove road network (1420, 1421).

While all four Control Lake Project Area WAAs are used by Thorne Bay hunters, only WAA 1319 is used to a significant extent. The TRUCS map (Figure 3-17) shows that this use is concentrated along road corridors. The TRUCS map also shows that the heaviest documented use of WAA 1319 by Thorne Bay hunters is of that portion of the WAA not included in the Project Area.

Whale Pass

Whale Pass deer hunters reportedly use three of the four Control Lake Project Area WAAs from which they take about 20 percent of the community's total deer harvest. They report no use of WAA 1323. The TRUCS map and project interviews indicate that hunting use of the Project Area is almost exclusively road-oriented. Few Whale Pass residents reported using the Project Area as a primary hunting area in other than an opportunistic way, taking deer as available on their trips to and from Craig and Klawock.

Figure 3-17
Thorne Bay TRUCS Map (Areas Ever Hunted for Deer—Percent of Households)



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Other Potential Study Communities

Of all communities with documented deer harvest of any level within Control Lake Project Area WAAs, about half were eliminated from consideration as study communities because their documented harvest was very small and, in most cases, quite variable (Galginaitis, 1994). Four of the communities—Hyder, Kasaan, Metlakatla, and Saxman—while not treated as study communities, are discussed briefly here because of the uncertain quality of the available information. For all four of these communities, the community's use of the Project Area is peripheral to its general pattern of subsistence resource use.

Hyder takes a significant percentage of its total deer harvest from the Project Area. However, this number is very small both in terms of the total deer harvest taken from the Project Area and the total Hyder community harvest of all subsistence resources.

The available information on Kasaan deer harvest is consistent with a pattern of preferred local use and access by boat. Kasaan until recently has not been connected to the Prince of Wales Island road network. ADF&G documents harvest only from WAA 1315, the immediate Kasaan area, with some community effort reported in other limited areas. More distant areas (Prince of Wales Island, Admiralty Island), accessed by boat, were less frequently used. Whereas in the past the Kasaan hunting use area included parts of the Control Lake Project Area, such as Black Bear Lake, this is currently perceived as a peripheral use area. Kasaan residents generally has not used the road network for deer hunting.

ADF&G information suggests that Metlakatla hunters concentrate in areas close to their community. ADF&G-updated TRUCS information (Betts et al., 1993) also confirms this pattern of mostly local use. Two informed local sources, the Mayor of Metlakatla and the Director of Natural Resources for the Metlakatla Village Corporation, indicated that few Metlakatla residents used the Control Lake Project Area for subsistence activities.

As with many Native communities, available ADF&G hunter survey information on Saxman is generally thought to be relatively unreliable. Only 29 deer are reported to have been harvested by Saxman residents for the 4-year period 1988 to 1991, with seven (24 percent) coming from the Control Lake Project Area (varying from 0 to 39 percent). Saxman residents report taking no deer in any areas in 1988 or 1989. ADF&G acknowledges that its information for Saxman is somewhat weak and cautions that because of low response rates "study results for Saxman and Hydaburg should be used with caution" (Kruse et al., 1988). Consequently, the field work for the Control Lake Project involved interviews in Saxman, Ketchikan, and Hydaburg with Saxman residents. The results of the field investigations confirmed the literature description of Saxman's hunting use area. Few Saxman hunters travel to Prince of Wales Island specifically to hunt deer, but those who do visit in hunting season will sometimes hunt. This is a very different pattern from that of nearby Ketchikan hunters who very actively use Prince of Wales Island for deer hunting.

Affected Resources

The Project Area supports a wide variety of subsistence activities including harvesting fish, deer, bear, waterfowl, furbearers, clams, crabs, shrimp, and gathering berries and seaweed. In addition, many residents use trees for firewood and lumber. Of these resources, the Control Lake Project could most affect deer, bear, furbearers, and fish. The current use of these resources is discussed below.

Deer

The Sitka black-tailed deer is an important subsistence species found throughout the Project Area. Deer populations on Prince of Wales Island are now moderately high following a decline in the 1970s. The general hunting season is August through late December. Harvest is generally concentrated during two periods: the first few weeks of the season in August and later in November when the rut occurs. Although most of the early deer harvest occurs from or near a timber harvest access road (Mankowske, 1985), a significant harvest effort is directed toward traditional alpine areas where deer, especially bucks, are concentrated during August.

In 1987, deer constituted an average of 13 to 32 percent of the total subsistence harvest for each household: Coffman Cove, 32 percent; Craig, 22 percent; Hollis, 23 percent; Hydaburg, 13 percent; Klawock, 15 percent; Thorne Bay, 20 percent; and Whale Pass, 27 percent (Kruse and Muth, 1990). Table 3-19 provides the total deer harvest by community and WAA from 1988 through 1991. Craig residents harvested the greatest number of deer, followed by Ketchikan residents, Klawock residents, and Thorne Bay residents.

Table 3-19

Summary of Deer Harvest for Communities with Any Reported Harvest in Project Area WAAs, 1988-1991

	WAA Harvest					Community Project Area WAA Harvest			
Community	1318	1319	1323[1/]	1421	Total	Other WAAs	% PA	% Com.	Total Harvest
Coffman Cove	**0**	**2**	**157**	**159**	**318**	**267**	3.98	37.3	426
Craig	715	181	147	106	1,149	**1,129**	28.79	50.44	2,278
Hollis	6	0		6	12	71	0.30	14.46	83
Hydaburg	4	8	7	9	28	128	0.70	17.95	156
Hyder				2	2	9	0.05	18.18	11
Juneau	0	0	0	30	30	14,813	0.75	0.20	14,843
Ketchikan	**105**	**217**	**122**	**380**	**824**	**5,287**	20.65	13.48	6,111
Klawock	475	100	137	44	756	**394**	18.94	65.74	1,150
Long Island Camp	3	5		8	131	0.20	5.76	139	
Metlakatla	2	2		0	4	144	0.10	2.70	148
Naukati			10	0	10	105	0.25	8.70	115
Other Alaska[2/]	12	21	2	7	42	16,602	1.05	0.25	16,644
Outside Alaska	37	13	3	15	68	208	1.70	24.64	276
Petersburg	**15**	**19**	**54**	**24**	**112**	**4,346**	2.81	2.51	4,458
Point Baker					3	73	0.08	3.95	76
Saxman	0	7			7	22	0.18	24.14	29
Thorne Bay	**43**	**588**	**18**	**49**	**698**	**696**	17.49	50.07	1,394
Whale Pass	**10**	**18**		**8**	**36**	**146**	0.90	19.78	182
Wrangell	5	27	5	6	43	1,293	1.08	3.22	1,336
Subsistence	1,290	978	383	418	3,069		76.90		
Non-subsistence	142	230	125	425	922		23.10		
Total	1,432	1,208	508	843	3,991				

Source: Thornton, 1992.

1/ WAA 1323 was numbered as WAA 1321 in 1988.

2/ Communities with low and sporadic documented harvest from the Project Area—includes Edna Bay, Haines, Meyers Chuck, Natzuhini Camp, and Sitka.

BOLD indicates most significant harvests (as part of community's total harvest, total harvest from WAA or Project Area, or both).

UNDERLINED indicates harvests potentially significant for other than numerical values as such. The Control Lake Project Area contains only portions of WAAs 1318, 1319, and 1421. It contains most or all of WAA 1323.

PA Project Area

Table 3-20 lists current deer harvest by Project Area WAA. There is concern that with increasing harvest levels in these WAAs and decreasing deer habitat capabilities (see *Wildlife* section) deer numbers may eventually fall short of numbers needed to support harvest. Because subsistence use has priority over non-subsistence use, at some time in the future it may be necessary for the Federal Subsistence Board to restrict the number of deer harvested by non-rural hunters to leave adequate numbers of deer for subsistence users.

Table 3-20
Current Harvest of Sitka Black-Tailed Deer By WAA

WAA	Average Annual Total WAA Harvest 1988-91[1/]	Average Annual Subsistence WAA Harvest 1988-91[2/]	Predicted Total WAA Harvest 1995[3/]
1318	358	323	391
1319	302	245	330
1323	127	96	139
1421	211	105	231
Total	998	769	1,091

Source: Thornton, 1992. Data derived from ADF&G total WAA deer harvest data.
1/ Values in table indicate number of deer.
2/ Includes entire WAA, including portions outside the Project Area
3/ Assuming harvest levels increase 1.8% per year.

The problem exists primarily within the heavily roaded WAAs 1318 and 1319. These two WAAs include or are immediately adjacent to three of the largest communities on Prince of Wales Island: Craig, Klawock, and Thorne Bay.

Among local communities, Craig, Klawock, and Thorne Bay have taken 50 percent or more of their deer harvest from Project Area WAAs (Table 3-42). Project Area WAAs provided 10 to 50 percent of the community deer harvest for Coffman Cove, Hollis, Hydaburg, Hyder, Ketchikan, Saxman, and Whale Pass. The communities of Juneau, Long Island Camp, Metlakatla, Naukati, Petersburg, Point Baker, Wrangell, and others derived less than 10 percent of their annual harvest from Project Area WAAs.

Black Bear

Table 3-21 displays the current black bear harvest by Project Area WAA. An average of 44 black bears were reported to be harvested annually in the Project Area from 1988-1989 through 1990-91. There is concern that habitat capability may not be sufficient to satisfy harvest levels over the long-term for WAA 1318. Harvest levels, and particularly subsistence harvest levels, appear to be low enough in the other WAAs of the Project Area, to avoid conflicts with available habitat. These factors balance out to some degree on an area-wide (Project Area) basis, but could create some localized resource problems. The apparent overharvest of black bear in WAA 1318 indicates that demand may outstrip supply in readily accessible areas, and that similar problems could easily develop in the rest of the Project Area WAAs. This could result in the need to restrict non-subsistence harvest of black bear in the Project Area in the future.

Table 3-21
Current Harvest of Black Bears by WAA

WAA	Average Annual Total WAA Harvest 1987-91[1/]	Average Annual Subsistence WAA Harvest 1987-91[2/]	Predicted Total WAA Harvest 1995[3/]
1318	32	11	35
1319	9	6	10
1323	1	0	1
1421	2	1	3
Total	44	18	49

Source: Paul, 1992. Data derived from ADF&G total WAA bear harvest data.
1/ Values in table indicate number of bears.
2/ Includes entire WAA, including portions outside the Project Area.
3/ Assuming harvest levels increase 1.8% per year.

Most of the reported black bear harvest is from WAA 1318, but it is unknown how much of this comes from the Project Area itself. Subsistence bear harvest, especially in WAA 1323, may be under represented in ADF&G harvest statistics. WAA 1323 is reported as a prime use area for deer, fish, and plant subsistence resources, but has no reported take of bear by subsistence hunters, which seems unlikely. However, interviews conducted in Craig and Klawock (the subsistence communities closest to this area) indicated that few local hunters actually took black bear.

The future demand for black bear is uncertain. The subsistence harvest of black bear from the Project Area has been far less variable than the non-subsistence harvest. Black bear are not hunted by the population as a whole to the same degree as deer. All interviewees reported that the majority of black bear taken in the Project Area are harvested by non-subsistence hunters and that the subsistence take was relatively minor.

Marten and River Otter

Furbearer harvest supplements the seasonal income of many area residents, most of whom are subsistence users. The intensity of trapping differs from the occasional trapper who targets primarily marten and beaver close to the road system to those individuals pursuing all furbearers both near to and far from the road system. Harvest effort usually is concentrated along the saltwater-upland interface, and near or along major river systems. Marten appear to be the most old-growth-associated of the furbearers, and are trapped intensively in old-growth areas adjacent to the road system.

Tables 3-22 and 3-23 display the marten and river otter harvest and habitat capability by WAA. An estimated 146 marten were harvested annually in Project Area WAAs from 1988 to 1992. Marten habitat capability may be lower than that needed to support harvest in WAAs 1318 and 1319. Restriction of non-subsistence harvests could be necessary in the future.

Table 3-22
Current Harvest of Marten by WAA

WAA	Average Annual Total WAA Harvest 1988-91 2/	Predicted Total WAA Harvest 1995 3/
1318	66	72
1319	59	65
1323	0	0
1421	21	23
Total	146	160

Source: Paul, 1992. Data derived from ADF&G total WAA marten harvest data.

1/ Values in table indicate number of martens.
2/ Includes entire WAA, including portions outside the Project Area
3/ Assuming harvest levels increase 1.8% per year.

Table 3-23
Current Harvest of River Otters by WAA

WAA	Average Annual Total WAA Harvest 1988-91 2/	Predicted Total WAA Harvest 1995 3/
1318	7	8
1319	5	5
1323	0	0
1421	4	4
Total	16	17

Source: Paul, 1992. Data derived from ADF&G total WAA river otter harvest data.

1/ Values in table indicate number of river otters.
2/ Includes entire WAA, including portions outside the Project Area.
3/ Assuming harvest levels increase 1.8% per year.

An estimated 16 river otter were harvested annually in Project Area WAAs from 1987 to 1991. Populations needed to support current river otter harvests are believed to be close to or below the habitat capability in the Project Area. Interviewees did not report any significant trapping or other use of river otter. More trapping was done historically than occurs today. Trapping activity levels generally reflect the price of fur and because fur prices are currently low (and have been for some time), few people are trapping. ADF&G harvest data do not show the residence of those who harvest river otters.

Wolf
Table 3-24 contains summary harvest data for the wolf. Local interviewees reported that the local wolf population was healthy. However, the harvest rate appears to be high relative to available habitat (see *Wildlife* section). Restrictions on non-subsistence users may be necessary in the future.

Table 3-24
Summary of Documented Project Area Wolf Harvest

Year	Total	1318	1319	1323	1421
1987-1988	18	9	3	0	6
1988-1989	8	4	4	0	0
1989-1990	15	5	4	0	6
1990-1991	6	0	0	1	5
Average	11.8	4.5	2.8	0.2	4.2

Source: Harvest data provided by ADF&G.

Fish

Salmon and trout are the principal subsistence fish resources in the Project Area. Sockeye is by far the most important species. Chum and pink salmon are also caught in the Klawock River, but at only about 5 percent of the sockeye numbers. Other species are harvested in the other locations as well, but at very low reported levels. Information on harvest by community is not very reliable because of the various modes of harvest. The ADF&G maintains statistics on personal use/subsistence permits for salmon (Table 3-25) but not all subsistence users apply for such permits. Many catch and retain fish under sports regulations or as part of a commercial operation. Others may fish without a permit. Not all people who fish with personal use/ subsistence permits report their harvest or where they fished. Thus, using such permit information as a full measure of subsistence fishing clearly understates the real use of this resource. TRUCS information, although dated, probably is still the best available data on community reliance upon fish resources.

Table 3-25
Project Area-Related Streams, Permit and Harvest Statistics (1985 to 1993)

	Annual Average	Average Annual Harvest (Number of Fish)			
Stream	Number of Permits	Sockeye	Coho	Pink	Chum
Klawock River	143	2,779	140	157	115
Karta River	128	1,593	5	14	1
Thorne River	4	51	0	17	0
Shinaku Creek	less than 1	0	0	0	30

Source: Personal Communication, Gary Timothy, ADF&G, Commercial Fisheries, Juneau, 1994.

ADF&G permit information for the Control Lake Project Area (Table 3-26) also is perhaps less useful than for other areas because permit holders report using few Project Area streams. Field interviews indicated that Elevenmile Creek and other streams in the western part of the Project Area are used for fishing, yet no permits were reported for use in these waters. Only four

Project Area-related streams appear in ADF&G permit statistics (included in the tables below along with "location not specified"). Although not actually within the Project Area, all are potentially affected by activities within the Project Area.

For the most part, subsistence resources have been discussed primarily in terms of fish and wildlife. In part, this is due to the fact that these subsistence resources are perceived (by users as well as researchers) to be most at risk. It is also partly due to the fact that information on the use of other subsistence resources is less well developed than for fish and wildlife. Some rural residents certainly rely on wood for heat, cooking, and cabin construction; plants for food and medicine; and various other resources for craft and other utilitarian uses. With few exceptions, the people interviewed during subsistence field work conducted for the Project Area did not think that other resources or uses would be much affected by the proposed action. The major exception was the Western Peninsula area of WAA 1323. The coastal areas of this WAA are important for the collection of seaweed, shellfish, marine mammals, and other resources, particularly by the residents of Klawock. More interior areas are important for the collection of other vegetable resources.

Table 3-26

Average Yearly Number of Subsistence/Personal Use Permits Used in Selected Locations and Average Salmon Harvest by Species by Community (1985 to 1993)

	Location of Permit							Salmon Harvest by Species			
Community	Not Specified	Shinaku Creek	Thorne River	Klawock River	Karta River	Other	Total Permits	Sockeye	Coho	Pink	Chum
Coffman Cove	3	0	0	0	0	3	6	63	0	0	0
Craig	70	0	0	41	17	47	175	1,745	5	83	22
Hollis	1	0	0	0	3	1	5	75	0	2	0
Hydaburg	16	0	0	1	1	40	58	1,205	6	45	5
Ketchikan	116	0	1	20	91	214	442	6,467	18	416	358
Klawock	31	0	0	79	2	15	127	2,072	17	175	106
Metlakatla	No Permits reported — Special status as a reservation										
Naukati	No permits reported										
Saxman	1	0	0	0	0	0	1	5	0	0	0
Thorne Bay	29	0	3	1	1	38	72	766	2	20	5
Whale Pass	1	0	0	0	0	2	3	39	0	10	0
Other	0	0	1	13							

Source: Personal Communication, Gary Timothy, ADF&G, Commercial Fisheries, Juneau, 1994.

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Cultural Resources

Key Terms

Cultural resources—all evidence of past human-related activity. It may be historic, prehistoric, architectural, or archived in nature. Cultural resources are nonrenewable aspects of our national heritage.
Sensitivity zone—defined as "high," "medium," or "low," based on the probability that they might contain cultural resources.
SHPO—State Historic Preservation Officer.

Introduction

Few archaeological sites have been excavated and analyzed in Southeast Alaska; consequently, the prehistory is understood in only its broadest outlines. Most of the work has been done on Baranof, Admiralty, and Chichagof islands, and the Chilkat Peninsula. Four sites have been excavated on Prince of Wales Island, three on Heceta Island, and one on Kupreanof Island. With this limited database, the conclusions drawn must necessarily be broad, even on a regional scale. Several labels have been applied to the apparent chronological divisions observed in recovered artifacts; however, only the most recent categories (Davis, 1990) will be used for the following discussion.

Ethnohistory of Project Area

Prehistory

Radiocarbon dates of paleontological remains indicate that portions of the Control Lake Project Area were apparently free from glacial ice at least 11,000 years ago. The earliest evidence of human occupation of central Prince of Wales Island is approximately 8,000 years ago at the Thorne River site, along the Thorne River near the eastern edge of the Project Area.

The Paleomarine Tradition (10,000 to 6,500 Before Present [B.P.]) is the earliest recognized cultural tradition (Table 3-27). Sites or components of sites assigned to this tradition contain microblades, wedge-shaped microblade cores, and few or no bifacially flaked stone tools. Animal remains at these sites include fish bone and marine shell, indicating a coastal marine subsistence (Davis, 1990). The Thorne River site on Prince of Wales Island is assigned to the Paleomarine Tradition (Holmes, 1989), as are two excavated sites on Heceta Island (Ackerman et al., 1985).

As its name implies, the Transitional Stage (6,500 to 5,000 B.P.) represents a transition between the technology of the Paleomarine Tradition and that of the later Developmental Northwest Coast Tradition. Faunal and floral remains and the inland location of some sites suggest adaptation to a changing environment (Davis, 1990).

The Developmental Northwest Coast Tradition (5,000 B.P. to contact) contains multiple phases and is distinguished from the Transitional Stage by the presence of shell midden deposits, ground stone and bone technology, human burials, larger settlements (winter villages), specialized subsistence camps, fortifications, and native metal (Davis, 1990). The Coffman Cove and Sarkar Cove sites and Yatuk Creek Rockshelter, north of the Project Area in the central portion of Prince of Wales, and Rosie's Rockshelter on Heceta Island contain components from this tradition (Ackerman et al., 1985; Arndt et al., 1987; Clark, 1979a, 1979b, and 1980; Rabich-Campbell, 1984). The beginning of this tradition possibly corresponds to the entry of the contemporary Native population, known as the Tlingit, into the area.

Table 3-27
Cultural Chronology

Tradition	Date	Cultural Material	Selected Sites
American Historic	A.D. 1867	Modern tools, structures, and social systems. Gold discovered in SE Alaska in 1869	Numerous
Russian Historic	A.D. 1798	Historic fur trade goods; metal tools, glass, ceramics, beads. Trade as early as 1750	Numerous
Developmental NW Coast Late Phase	1000-1750 B.P.	Native copper, stone vessels Increased use of obsidian, rise of fortified sites and villages	Starrigavan, Russian Cove, Old Town, Yatuk Creek Rockshelter
Developmental NW Coast M Middle Phase	3000-1000 B.P.	Unilaterally barbed points, Nephrite, ground burins, toggling harpoons, small end blades	Hidden Falls, Sarkar Entrance, Young Bay, Yatuk Creek Rockshelter, Portage Arm
Developmental NW Coast Early Phase	5000-4000 B.P.	Ground stone, bone, Woodworking tools	Hidden Falls, Rosie's Rockshelter, Coffman Cove, Traders Island
Transitional Stage	6500-5000 B.P.	Ground stone, bifacial flaked stone	Lake Eva, Chuck Lake, Irish Creek
Paleomarine	10,000-6,500 B.P.	Unifacial flaked stone, cores, Blades, fish bones, marine shell	Hidden Falls, Chuck Lake, Thorne River, Ground Hog Bay

Source: Davis, 1990.

Although the exact dates of occupation are not known, the Tlingit were well established in Southeast Alaska by the time of first Russian contact. The settlement and subsistence patterns of the Tlingit demonstrate a long-term adaptation to their environment.

Prince of Wales Island was formerly divided among several subgroups of Tlingits: the Stikine (Shtax'heen Kwaan) included the northeast coast in their territory; the Henya (Heinyaa Kwaan) inhabited the northern half of the western part the island; the Klawock (Lawaak Kwaan), who may also have been part of the Henya, resided along the west central coast; and the Tongass (Taant'akwaan) held the southern third of the island before the Kaigani Haida displaced them (about 1700 A.D.) to a small section along the coastline of southern Southeast Alaska and islands to the east (Arndt et al., 1987).

Unlike the mainland Tlinglit groups which established permanent villages that they used throughout the year, Tlinglits on the islands used villages only from November through March (Oberg, 1973). The island villages were situated in sheltered areas from which they exploited land-based resources such as land mammals and timber (for canoes). These were also the locations of major ceremonies. In March, people would move to the outer islands to harvest seals, deep sea fish, shell fish, and birds eggs. From July through October, the primary subsistence focus was sockeye salmon. Other activities included trading, raiding for slaves, harvesting berries, and hunting land mammals (Ackerman et al., 1987; Langdon, 1977).

History

Beginning in the late eighteenth century, Russian, British, French, and American explorers and fur traders established contact with the Tlingit of Prince of Wales Island. Outside explorers brought disease—smallpox, typhoid, and measles—which had a significant impact on the Native population. Survivors of the severe smallpox epidemic of 1835-1838 moved from small villages to larger ones (De Laguna, 1972, 1990). This consolidation likely occurred on Prince of Wales Island as well, resulting in the abandonment of traditional villages and the relocation to non-Native towns and canneries.

Between 1872 and 1886, several events occurred at Klawock that affected the traditional life of the Tlingit. These include the establishment of a saltery in 1872, a cannery in 1878 (the first on Prince of Wales Island), and a school with a teacher by 1886 (Mobley, 1993; Selkregg, 1976). By 1900, the remaining Tlingit from Tuxekan had moved to Klawock (Davis, 1977). The next non-Native development in the area was a substantial mining effort, followed finally by the timber industry. The introduction of these industries allowed many Natives to supplement their traditional, subsistence way of life with wage labor (Arndt et al., 1987; De Laguna, 1990). Logging, mining, and the development of cottage industries to accommodate a growing tourist market also provided opportunities for Natives to work for pay.

As supported by written records and archaeological evidence, acculturation had little effect on the Tlingit way of life until the influence of American industry in the late nineteenth century. By 1900, Native people had shifted from their traditional village life and relocated for wage labor. However, canneries like that at Klawock were starting to replace Native laborers with cheaper Chinese laborers, although there was still employment for the Natives as fisherman (Moser, 1902).

The U.S. Fish Commission first compiled reports on salmon-related activities on Prince of Wales Island in 1897. Earlier reports by special agents of the Treasury Department indicate that the Klawock cannery was very active in 1893. In 1905, a total of 177 employees were reported by North Pacific Trading and Packing Company in Klawock, including 98 Natives.

The Department of Commerce and Labor Bulletin from 1906 regarding coho salmon, records fishing in Klawock Inlet and Tonowek Bay in 1900 and from 1904 to 1906, and in the Gulf of Esquibel in 1906 (House Document No. 356, 1907). While actual fishing was taking place offshore and in the streams of Prince of Wales Island, the industry brought people, buildings, and work to the island. The Tlingits went to work for the canneries, moving from their Native villages to settlements around the canneries (De Laguna, 1990). Thus, the fishing industry played a large role in the acculturation of the Tlingit and their shift in emphasis from a subsistence way of life to one of wage labor.

The first copper prospect on Prince of Wales Island was located in 1867. Since then, more than 40 mines have operated in the Ketchikan mining district; the Kasaan Peninsula has been one of the major and most productive lode mining areas up to the early 1940s. Two of the more productive Kasaan mines, located closest to the Project Area, are the Salt Chuck, which operated intermittently from 1907 to 1941, and the Rush and Brown, which operated between 1906 and the 1920s. Copper mines and prospects were also operated in the late 1800s and early 1900s in the Hollis, Hetta Inlet, and Niblack/Dolomi areas (Rakestraw, 1981).

In the late nineteenth century, prospectors also discovered that Southeast Alaska was rich in nonmetallic, nonfuel resources used in industry and construction. The first discovery was marble, and three quarries were eventually established in the northern Prince of Wales area. Between 1897 and 1902, individuals staked claims for areas on Marble Creek at Calder, Dry Pass at El Capitan, and Red Bay. The sale and production of marble from Southeast Alaska steadily increased from 1904 to 1926 (Roppel, 1991), but by 1932 demand was no longer great enough to keep the Southeast Alaska quarries open.

The timber industry has also had significant impacts on Southeast Alaska, the physical remains of which can still be seen in the central Prince of Wales area. The earliest logging and milling operations in the area were connected with salteries and canneries at Shakan and Klawock. By 1889, both steam and water sawmills were reported in Klawock along with a water mill at Shakan which produced timber for docks and buildings and lumber for boats, barrels, and boxes. These mills and others in Southeast Alaska also produced timber used in copper mine and marble quarry operations (Rakestraw, 1981).

President Theodore Roosevelt initiated the Federal presence in the forests of Alaska. From the beginning of his presidency in 1901, Roosevelt was interested in creating forest reserves in Alaska. He asked renowned Alaskan expert Lt. George Thornton Emmons to prepare a report on the potential of such an undertaking. Emmons recommended considering several areas of Southeast Alaska, including Prince of Wales Island. In 1902, a presidential proclamation reserved the lands that Emmons suggested and the Alexander Archipelago Forest Reserve was created (Arndt et al., 1987; Rakestraw, 1981).

During that time the population of the Forest Reserve was limited largely to Alaska Natives and employees of the mining and fishing industries. On Prince of Wales Island, timber was used by the mine and quarry operators for buildings and railroads and by the fishing industry for their wharves, buildings, and netting constructions. While no sawmills were located in the current Project Area, a mill existed at Klawock, and another just to the north in Shakan in 1905 and one was built at Craig in the 1910s. All geared their output to mining, quarrying, and fishing operations (Rakestraw, 1981).

In July 1908 the Tongass National Forest assumed control of the Alexander Archipelago Forest Reserve with a combined area totalling 6.2 million acres. Timber sales grew along with salmon fishing. Following passage of the Antiquities Act of 1906, Forest Service personnel were encouraged to report outstanding examples of cultural properties. As a result, the totem poles and community houses at Tuxekan and Old Kasaan were recommended for in situ preservation (Rakestraw, 1981).

Timber sales from the area flourished from the 1920s through the 1940s, due in part to demands by Civilian Conservation Corps (CCC) work projects and, later, World War II. While pulp production had been attempted at an earlier date, it was not until after World War II that large-scale pulp production became feasible in Southeast Alaska, once again increasing timber sales and production in the area (Arndt et al., 1987; Rakestraw, 1981).

The Native Tlingit historically have used the trees for building homes and making canoes, and they hunted in the forests from the beginning of their occupation. The influx of mining and fishing industries with European and American backing increased the need for processed lumber. The sawmills at Klawock and Shakan were built in the late 1800s to meet these needs. With the withdrawal of the area as part of the Tongass National Forest, lumber interests began seeking a wider business market abroad.

In the 1930s, the Indian Reorganization Act incorporated some villages, such as Klawock, and aided them in acquiring land and sawmills (De Laguna, 1990). Then, in 1971 under the ANCSA, the Tlingit and Haida formed the Sealaska Regional Corporation in ten remaining historic villages (De Laguna, 1990). Although industry brought about changes in the life ways of the Tlingits, resulting in a decline in traditional values, tribal identity has not been lost. The clan system, singing and dancing, Native crafts, and death customs have experienced a strong revival since the 1970s.

The traditional practitioners among the Tlingit people who have settled in Klawock and Craig maintain strong connections with specific locations and general areas along the west coast of Prince of Wales Island. Research by anthropologists since the early 1900s has documented the strong ties to the coastal areas, as well as small and large off-shore islands (Garfield and Forrest, 1948; Langdon, 1977; R. L. Olson, 1967; W. M. Olson, 1989; Peratrovich, 1959; Sealaska, 1975; Swanton, 1908). The best information specific to the west coast portion of the Project Area was presented at the Control Lake Project Scoping Meeting (October 18, 1993) (Enserch Environmental, 1994). Resources hunted or gathered, by location, include abalone, sea cucumbers, sea ribbons, chiton, and seaweed along the Elevenmile shore; coho salmon from streams either side of Blanquizal Point; coho, sockeye, and humpback (pink) salmon from Salt Lake Bay; wild asparagus from the southern end of Salt Lake Bay and southeastern end of Nossuk Bay; sea cucumber along the southern shore of Nossuk Bay and south along the coast for one or two miles; king salmon south from Salt Lake Bay for 10 miles; Dungeness crab and fish trapping south of Blanquizal Point; swamptea berries in the interior near the south end of VCU 592; and deer in the hills in the interior in September and October. While scoping comments at the Klawock meeting did not address religious practices in the area, people at the meeting acknowledged that the ability of the Tlingit to hunt and gather in the west coast area was connected to the cultural well being of the group.

Control Lake Cultural Resource Inventory

A discussion of previous cultural resource surveys can be found in Greiser (1994). These surveys provided a starting point for the Control Lake cultural resource inventory. The cultural resources study for the Control Lake Project Area was designed to satisfy Federal and State resource management legislation as summarized in regulations prepared by the President's Advisory Council on Historic Preservation (36 CFR, Part 800). These regulations encompass the requirements of Section 106 of the National Historic Preservation Act of 1966, the National Environmental Policy Act of 1969, and FSM 2300, among other laws and regulations. The cultural resource inventory plan, consistent with Forest Service and Alaska Heritage Resource Survey (AHRS) guidelines, included pedestrian examination of the ground surface, along with subsurface investigation where necessary, to recover adequate data to assess the potential for significant resources in the proposed timber sale area. The objectives of the technical study included:

- Inventory known cultural resources through background research; locate additional sites in the Project Area based on an approved inventory plan including intensive survey of proposed harvest units and roads in high probability areas; survey additional blocks of land outside harvest units in high probability areas; and attempt to relocate previously recorded sites for detailed recording and evaluation in areas that might be subjected to increased activity.
- Evaluate the significance of located cultural resource sites in terms of the National Register of Historic Places criteria.

Cultural survey work

- Determine the potential effects of each project alternative on significant sites and compare effects among the alternatives.
- Recommend measures to mitigate potential adverse effects on significant resources and discuss the possible effectiveness of the measures.

This chapter discusses the first two objectives. Chapter 4 contains the findings relating to items 3 and 4. A detailed discussion of the cultural resources inventory methods are contained in Greiser (1994). A discussion of the existing cultural resources inventoried follows.

Project Area Cultural Resources

The project inventory identified a total of 41 cultural resource properties within the Project Area (Table 3-28), of which 39 required full recording and evaluation. Two properties were on land conveyed to the State of Alaska and were not subjected to subsurface testing, full recording, or detailed mapping, based on an agreement between the Forest Service and the Alaska State Historic Preservation Office (SHPO). Thirteen of the properties, numbered between CRG-086 and CRG-302, had been previously located and at least minimally recorded.

A fourteenth previously located cultural resource property in the Project Area, the Thorne River Site (CRG-177), has been determined eligible for the National Register of Historic Places and subjected to the mitigation of road construction impacts through a data recovery plan (Holmes, 1989).

Three previously located properties (CRG-197, CRG-370 and CRG-371) were reported to be in the Nossuk Bay area, but were not relocated during the Control Lake Project survey and subsurface probing. The first property appears to be the subject of incorrect locational information. The problem with the other two properties may be that the recording forms were completed by a second person 10 years or more after the original investigator made notes about the properties. Also, locational information may have been incorrectly recorded or the properties may have been eroded or covered with sediments.

The cultural resource inventory in the Control Lake Project Area relocated 13 of the 17 previously reported properties listed in AHRS files and located and recorded 28 new properties. At this time none of the properties has been specifically identified as a traditional cultural/religious property, but reported use of the area by Tlingit people from Klawock and Craig may include currently undocumented traditional cultural places.

Table 3-28 summarizes the cultural resource properties confirmed or located during project fieldwork. These include: two bluff-top, defensive locations or fortifications with associated middens; 26 campsites (shell midden deposits)—three in rockshelters, two with associated canoe landings, and one with an associated stonefish weir; one lithic material campsite of Paleomarine Tradition; seven canoe landings, one with associated petroglyphs and one with an associated fish trap; four stonefish weirs in Salt Lake Bay, one of which is very elaborate; one carved cedar-log location; and one historic habitation, a cabin or log tent base. Unconfirmed cultural resource properties in the Project Area include two mining-related properties, two shell midden deposits, and one wood-stake fish weir.

Thirty-one of the properties fully recorded and evaluated during 1993 fieldwork are recommended as eligible for listing on the National Register of Historic Places as part of a proposed multiple property group. The two properties located during the inventory on land conveyed to the state of Alaska on Salt Lake Bay, although not fully tested and recorded, are likely to be eligible as part of the multiple property group. One property, the Thorne River Site (CRG-177), has been determined to be eligible for listing on the National Register and a major portion of it was subjected to data recovery.

Table 3-28

Known Cultural Resource Properties Within the Control Lake Project Area

Property (Site) Numbers			
Field Number	AHRS Number	Property Site Type	Cultural Affiliation
29-3[1]	CRG 425	Campsite	Aboriginal
29-4	CRG 163[2]	Cedar Carving	Aboriginal
32-11[1]	CRG 426	Rockshelter Campsite	Aboriginal
37-4	CRG 198[2]	Canoe Landing	Aboriginal
39-3[1]	CRG 429	Campsite	Aboriginal
39-4[1]	CRG 428	Campsite	Aboriginal
39-5[1]	CRG 427	Campsite	Aboriginal
42-3	CRG 196[2]	Fortification	Aboriginal
42-7	CRG 086[2]	Campsite, Canoe Landing	Aboriginal
591		CRG 197[3]	Campsite(?)
Aboriginal			
	CRG 370[3]	Campsite(?)	Aboriginal
	CRG 371[3]	Wood Stake Fish Weir(?)	Aboriginal
11-1[1]	CRG 409	Fortification	Aboriginal
12-1 to 12-14	CRG 302[2]	Canoe Landing, Petroglyphs	Aboriginal
13-1/13-2[1]	CRG 410	Fish Trap, Canoe Landing(?)	Aboriginal
14-1[2]/14-2[1]	CRG 299	Campsite, Stone Fish Weir	Aboriginal
14-5[1]/14-7[2]	CRG 298	Campsite, Canoe Landing	Aboriginal
15-2	CRG 295[2]	Canoe Landing	Aboriginal
15-3	CRG 296[2]	Canoe Landing	Aboriginal
15-4	CRG 297[2]	Canoe Landing	Aboriginal
15-1[1]	CRG 411	Rockshelter Campsite	Aboriginal
16-1[1]	CRG 412	Campsite	Aboriginal
19-5[1]	CRG 413	Campsite	Aboriginal
20-1[1]/20-4[1]	CRG 414	Stone Fish Weir	Aboriginal
20-7[1]	CRG 415	Stone Fish Weir	Aboriginal
20-9[1]	CRG 416	Campsite	Aboriginal
22-3	CRG 225[2]	Stone Fish Weir	Aboriginal
22-5[1]	CRG 417	Stone Fish Trap & Weir	Aboriginal
24-6	CRG 224[2]	Campsite	Aboriginal
24-7[1]	CRG 418	Campsite	Aboriginal
25-3[1]	CRG 421	Campsite	Aboriginal
25-5[1]	CRG 420	Campsite	Aboriginal
25-6[1]	CRG 419	Campsite	Aboriginal
26-3[1]	CRG 422	Log Cabin or Tent Base	Historic
27-4[1]	CRG 423	Campsite	Aboriginal
28-2[1]	CRG 424	Rockshelter Campsite	Aboriginal
1-3[1]	CRG 402	Campsite	Aboriginal
2-2[1]	CRG 404	Campsite	Aboriginal
2-4[1]	CRG 403	Campsite	Aboriginal
3-1[1]/3-2[1]	CRG 406	Canoe Landing	Aboriginal
3-3[1]	CRG 405	Campsite	Aboriginal
5-1[1]	CRG 407	Campsite	Aboriginal
5-4	CRG 194[2]	Campsite	Aboriginal
6-1[1]	CRG 408	Campsite	Aboriginal
	MN 70[5]	Mining Claim	Historic
	MN 77[5]	Mining Claim	Historic
	CRG 177[4]	Campsite	Aboriginal

[1] Property located and recorded as part of current study.

[2] Previously located property relocated and evaluated as part of current study.

[3] Previously located property searched for, but not relocated as part of current study.

[4] Previously located and evaluated property.

[5] Mining claim

Characteristics of Cultural Resources

Settlement Patterns

There is a clear pattern of distribution of aboriginal properties along the coastal portion of the Project Area. The areas most likely to have been occupied aboriginally are the low areas of coastline, especially those containing salmon streams, that provide off-shore island protection from major ocean storms, or large bays. Conversely, the rugged, exposed sections of coast were generally not habitable on a long-term basis.

Chronological Distribution

Forty-three radiocarbon dates have been obtained on charcoal and shell samples from 26 properties along the west coast of the Project Area. The dates range from 150 to 3460 B.P., uncorrected, and without standard deviations. The oldest cluster of dates consists of six samples dated between 2650 and 3500 B.P.; five of the six dates came from four properties around Nossuk Bay, including a fortification. Nine of the dated samples are distributed between 990 and 1630 B.P. The remaining 28 dates range from 150 to 900 B.P., with nine of those (21 percent of all the dates) between 800 and 900 B.P.

The ten dates for the cluster of properties in the Elevenmile Creek area range from 580 to 3240 B.P., with four in the 800 to 900 B.P. range. CRG-402, the most deeply stratified property tested, contains the oldest dated level for this cluster. The 10 dates for the cluster of properties lying north of Blanquizal Point peninsula range from 230 to 1780 B.P. The oldest three dates in this cluster (1510 to 1780 B.P.) are from properties south of the mouth of Salt Lake Bay. The eight dates from properties around Salt Lake Bay range from 150 to 1210 B.P. The lack of clustering in the dates indicates the bay has been used continuously for at least the past 1,200 years. The two dates obtained from properties along the coast between Salt Lake and Nossuk bays are 640 and 850 B.P. Thirteen dates from properties around Nossuk Bay range from 250 to 3460 B.P. In addition to the five dates at the older end of this range, five dates from four properties range from 250 to 410 B.P., indicating at least two peaks of occupation of the bay. The repeated or continued occupation of Nossuk Bay may be related to the bay's location on the boundary between two Tlingit clan territories.

Subsistence

Test units at 14 of the properties contained fish remains in one or more of the subsurface levels. The sample of scales and nearly 2,200 bones contains evidence of 14 taxa of very large to quite small fish. The most productive test unit for fish remains was at CRG-403 (58 percent of all fish remains), with CRG-412 containing the second most productive test unit (13 percent). Bones from large cod or pollock dominated the remains at both of those properties. Between 8 and 20 percent of the fish remains recovered from CRG-403, CRG-405, CRG-409, CRG-224, and CRG-196 were salmon bones. Comparing dated levels within and between properties, salmon, cod and pollock appear to be equally represented through time. Small flatfish tend to be more frequent in the older levels of properties. Herring, identified primarily through scales at CRG-412 and bones at CRG-408 and CRG-409, may be under-represented in material collected from test units, since maximum recovery of their small remains requires fine screens.

Fifteen of the properties also produced mammal remains from one or more levels of test units. Generally the bone is heavily fragmented either due to processing for consumption or post-occupation natural deterioration. Most of the identifiable bone is from land mammals, primarily deer; the only sea mammal bone represented, appears to be the bone harpoon from CRG-196. A few bird bone fragments were also recovered.

The most abundant cultural remains collected from properties in the Project Area is shellfish, particularly bivalves. Twenty-three of the 26 tested properties produced shell. Four of the properties produced shell from only two or three levels in test units, while the rest produced shell from 4 to 11 levels. While identifiable shell was present in nearly every property, one property contained only unidentifiable shell fragments in each level. Mussel shell and charcoal, because of their friable nature, tended to be the key indicators of subsurface cultural deposits in the small diameter soil auger probes. This tendency to fragment easily means that mussel shell is under-represented in the recovered samples. The most common bivalves in the collections are the Pacific littleneck clam and the butter clam. Fat gapers consistently occurred in small numbers in each sample, while seven additional bivalve species occurred sporadically. Non-bivalves occurred in low frequencies, with snails, periwinkles, welks, limpets, and chitons the most consistent. The majority of shellfish recovered during testing occur naturally in the sand and gravel or on rocks in the intertidal zone or are exposed or nearly exposed at unusually low tides.

National Register Registration Requirements and Recommendations

The properties located and recorded as part of the Control Lake EIS cultural resource study were evaluated for eligibility for listing on the National Register of Historic Places (36 CFR Part 60.4). Most of the properties recommended as eligible (Table 3-29) for the National Register are eligible under criterion D (the properties have yielded, or have the potential to yield, information important to prehistory or history). Property types, including middens, campsites, fortifications, and the one historic feature are recommended as eligible when one or more intact occupation surfaces are determined to be present, primarily through testing. The intact deposits have the potential to yield artifacts of chronological, economic, ritual, or ethnic significance. Biotic remains can provide information about aboriginal diet, season of occupation, climate, and, perhaps, ritual life. Charcoal and other organic materials provide chronometric data. Intact features such as cooking fires can provide information on diet and resource processing, while house remains can be used to address domestic spatial organization.

Petroglyphs are recommended as eligible under criterion C on the basis that they may represent the work of a master, possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction. Petroglyphs are rare in the Project Area; in other parts of Southeast Alaska they have been interpreted to be connected with clan ownership of an area and/or represent part of a ritual used to ensure good salmon harvests.

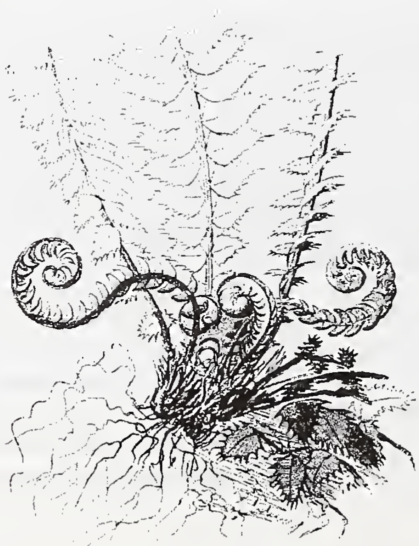
Campsites recommended as ineligible lack intact or undisturbed subsurface deposits. While deposits are present and have been subjected to radiocarbon dating, the properties do not have the potential to yield data beyond what was gathered during recording and testing. Canoe landings and fish weirs are recommended as ineligible if the majority of the features present are not intact and the information potential is better represented at properties with intact features. The log base for the cedar carving is recommended as ineligible because the carving was removed. This recommendation could change if information is obtained regarding the status of the location as a traditional cultural property.

The eligible properties are recommended as a National Register of Historic Places Multiple Property to address the significance of a group of related properties. This format recognizes the importance of the known properties and allows for inclusion of properties located in the future in or near the area. On the basis of current research, the section of the coast of Prince of Wales Island inventoried by the Project Team was part of the territory occupied and used by the Henya Tlingit, many descendants of whom now live in Klawock and Craig and still use the area.

Table 3-29

National Register of Historic Places Recommendations or Status for Cultural Resource Properties in the Project Area

Property Type	Listed	Eligible		Ineligible	Undetermined
Campsites	CRG-177	CRG-194	CRG-419	CRG-404	CRG-413
		CRG-224	CRG-420	CRG-407	CRG-416
		CRG-402	CRG-421	CRG-423	
		CRG-403	CRG-425		
	CRG-405	CRG-427			
		CRG-408	CRG-428		
		CRG-412	CRG-429		
		CRG-418			
Fortifications		CRG-196	CRG-409		
Rockshelter					
Campsites		CRG-411	CRG-426		
		CRG-424			
Campsite, Canoe Landings			CRG-086	CRG-298	
Canoe Landings		CRG-406		CRG-198	
				CRG-295	
				CRG-296	
				CRG-297	
Canoe Landings, Petroglyphs		CRG-302			
Fish Trap, Canoe Landing				CRG-410	
Campsites, Fish Weirs		CRG-299			
Fish Weirs		CRG-415		CRG-225	
				CRG-414	
Fish Traps, Fish Weirs				CRG-417	
Cedar Carving				CRG-163	
Log Cabin/Tent Base		CRG-422			
TOTAL		27		12	2



Visual

Key Terms

Background—the distant part of a landscape; the seen, or viewed area located from 3 to 5 miles to infinity from the viewer.
Character type—an area of land that has common distinguishing visual characteristics of landform, rock formations, water forms and vegetative patterns.
Characteristic landscape—usually a small portion of a character type that visually represents the basic vegetative patterns, landforms, rock formations and water forms which are in view.
Cumulative visual disturbance—the percent of a viewshed's seen area in a disturbed condition at any point in time.
Distance zone—divisions of a viewed landscape by foreground, middleground, and background zones.
Foreground—portion of viewed area from immediately adjacent to the viewing position to about a half mile from the observer's position; individual branches of trees are discernible.
Maximum Modification—a VQO which prescribes that an area may be dominated by management activities, but resulting visual characteristics should appear as a natural occurrence when viewed from the background distance zone.
Middleground—the visible terrain beyond the foreground from about 1/4 mile to 3 to 5 miles from the observer's position; individual trees are still visible but do not stand out distinctly from the landscape.
Modification—a VQO in which management activities may visually dominate the original characteristic landscape, but resulting visual characteristics must resemble natural occurrences within the surrounding area when viewed from the foreground and middleground distance zone.
Not seen—a mapping category associated with distance zones. Sensitivity Level 3 travel routes, use areas, and areas not seen or seldom seen from Visual Priority Routes and Use Areas have been mapped as Not Seen in the visual inventory. Also referred to as "Seldom Seen."
Partial Retention—a VQO in which management activities are to remain visually subordinate to the natural landscape.
Preservation—a VQO which permits ecological changes only; applies to wilderness areas and other special classified areas.
Retention—a visual quality objective which provides for management activities that are not visually evident to the casual observer.
Sensitivity level—a three-level measure of people's concern for the scenic quality of an area.
Unacceptable Modification—does not meet a VQO of Maximum Modification. Excessive modification due to management activities in which the design, size, extent, or duration are poorly related to the scale of landform and vegetative patterns in the characteristic landscape may result in unacceptable modification.
Variety class—classification of the landscape by the diversity and scenic quality of the natural landscape. The three classes are: Class A - Distinctive; Class B - Common; Class C - Minimal.
Viewshed—a defined landscape or panoramic vista seen from one or more specific viewpoints.
Visual Absorption Capacity (VAC)—an estimate of the relative ability of a landscape to absorb alteration yet retain its visual integrity.
Visual priority routes and use areas—the designated priority routes and use areas from which the proposed VQOs will be applied. Nonpriority travel routes and use areas, and those areas not seen from the Visual Priority Routes and Use Areas, are managed according to "Not Seen" criteria.
Visual Quality Objective (VQO)—management standards reflecting five degrees of acceptable alteration of the natural landscape based on a landscape's diversity of natural features and the public's concern for scenic quality.

Introduction

An important aspect of Southeast Alaska's natural resource base is its attractive setting. The importance of this scenic splendor is evident in increased tourism and a heightened concern for scenic resource values by Alaska's residents. The Visual Management System (VMS), developed by the Forest Service, inventories these scenic resources and provides measurable standards for their management. Initially, the VMS assesses the relative scenic quality (visual character type and variety class) of the Project Area, as found in its current state. The VMS then assesses viewer sensitivity levels based on the type and use of these landscapes.

Scenic quality, sensitivity levels and management goals are combined to establish VQOs. These parameters are also used to define the Existing Visual Condition (EVC). As set forth in the 1997 TLMP, the Desired Future Condition (DFC) describes how the Forest should appear in the future. The DFC for the Control Lake Project Area emphasizes landscapes with a modified appearance to a greater degree than for the Tongass National Forest as a whole. Together with other resource-related goals, objectives, and management prescriptions, these criteria help govern the location, design, and scheduling of management activities such as timber harvest in an attempt to achieve the DFC defined in the 1997 TLMP.

Visual Character Types

Visual character types describe landscapes that have common landform, rockform, water features, and vegetation. The southern reaches of the Tongass National Forest, including the Control Lake Project Area, are represented by the Coastal Hill and Kupreanof Lowland visual character types. Extensive landform variety exists in the Coastal Hill type and elevations range from 1,000 to 4,500 feet (Figure 3-18). Areas with elevations less than 3,500 feet were glaciated and have rounded, hummocky summits, knobs, and ridges. The communities of Thorne Bay, Craig, and Klawock are adjacent to the Project Area and within the Coastal Hill character type. Substantial timber harvest activities are evident on central Prince of Wales Island.

The Thorne River (Honker Divide) area, which contains a regionally significant and nationally recognized canoe route, lies within the Kupreanof Lowland visual character type. The landform in this type is rolling, heavily glaciated, and has a maximum relief of 1,000 to 1,500 feet (Figure 3-19). Scattered block-like mountains with rounded, hummocky summits of 2,000 to 3,000 feet in altitude rise above the general level of the lowlands.

Scenic Quality

Having defined the Project Area's character type, the next step is to assess the relative scenic quality of all landscapes. Landscapes are rated as follows:

Scenic Quality	Rating
High	Variety Class A
Average	Variety Class B
Low	Variety Class C

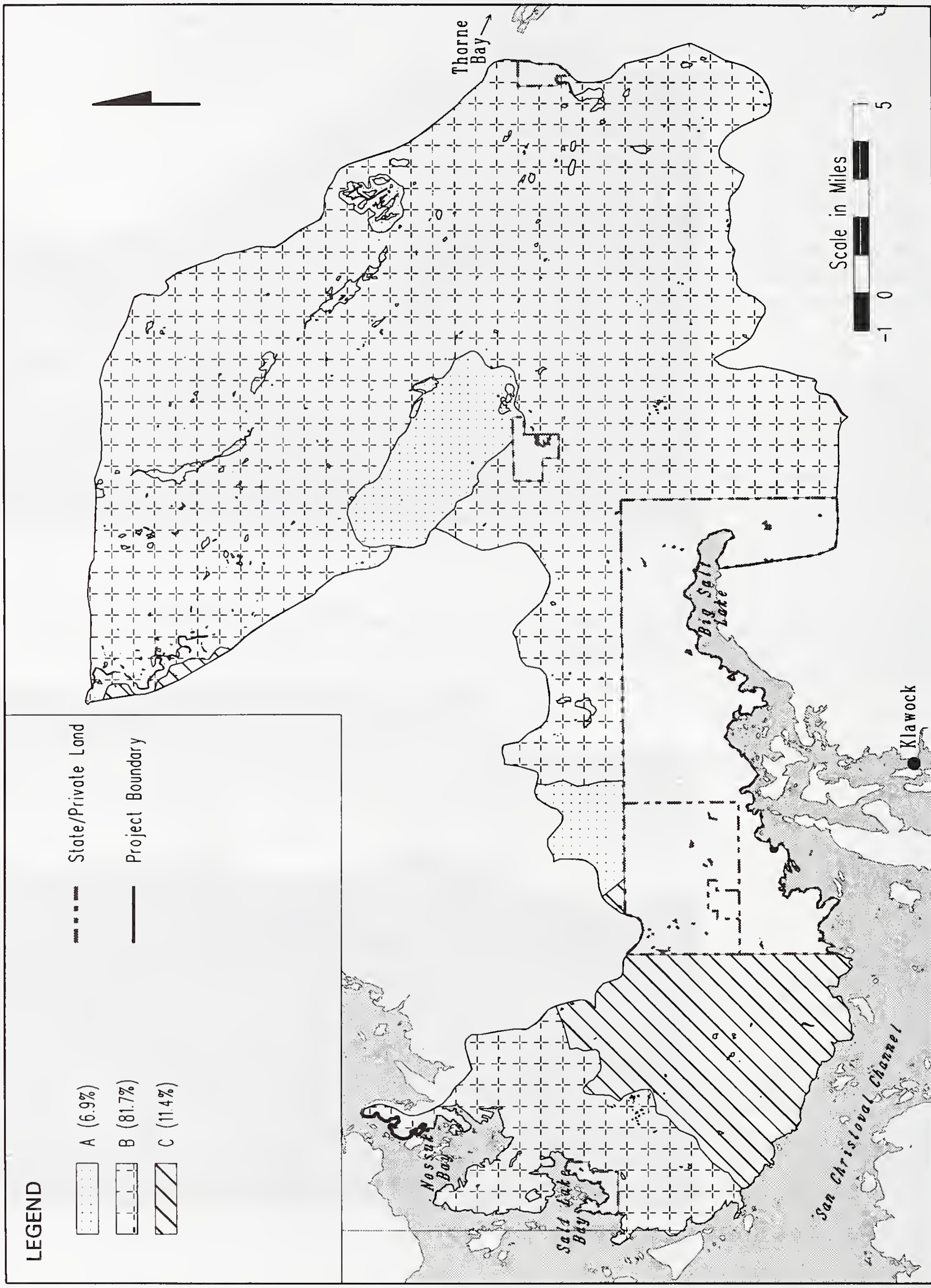
These ratings are based on the diversity of natural landform, rockform, waterform, and vegetation. All ratings are made relative to the overall character of the larger Kupreanof Lowland and Coastal Hill visual character types. Variety classes of the Project Area are shown on Figure 3-20.

An intricate network of interlacing waterways, muskegs, and complex shorelines results in a high scenic quality (Variety Class A) designation for Snakey Lakes. While continuously wooded, the southern flank of Kogish Mountain and an area bounded by Cutthroat Lakes and Balls Lake contain steep slopes and enough variety in landform to also be deemed Variety Class A. These areas account for 6.9 percent of the project's acreage on National Forest System lands.

Figure 3-18
Typical Scenery in the Coastal Hill Character Type of the Project

Figure 3-19
Typical Scenery in the Kupreanof Lowland Character Type of the Project

Figure 3-20
Variety Classes in the Control Lake Project Area



Most of the remaining land (81.7 percent), including the Thorne River drainage, is of average scenic quality (Variety Class B). However, lack of water features, topographic relief, and vegetative diversity combine to give much of the Kogish Roadless Area a low scenic quality (Variety Class C) designation.

Visual Sensitivity

The third part of the VMS measures the concern of National Forest visitors for scenic quality, as seen from recreation use areas, communities, travel routes (marine and land), anchorages, and cabins. Ratings are based on the type and frequency of use, and are categorized as Highest Sensitivity (Level 1), Average Sensitivity (Level 2), and Lowest Sensitivity (Level 3). The percentage of the Project Area in each Sensitivity Level is graphically depicted in Figure 3-21.

Sensitivity Level 1 areas (14.7 percent of the Project Area on National Forest System land) include those seen from principal recreation areas, major marine travel routes and communities. Within the Control Lake Project Area this includes the Forest Highway #9 (Forest Road 30) corridor, Thorne Lake (and Honker Cabin), Balls Lake, Control Lake, portions of the West Coast Waterway (south of about St. Philip Island), and the waters around Craig and Klawock (San Alberto, Shinaku Inlet, Klawock Inlet, and Big Salt Lake).

Sensitivity Level 2 (10.8 percent) is assigned to landscapes seen from moderately used recreation areas, boat routes, anchorages, and roads. This includes the eligible scenic and recreation class (Wild and Scenic River) stretches of the Thorne River (excluding Thorne Lake), the Forest Road 20 corridor and portions of the West Coast Waterway (north of St. Philip Island).

Sensitivity Level 3 (74.5 percent) is assigned to land areas not seen from any of the level 1 or 2 use areas. This includes much of the Western Peninsula, as well as the Logjam Creek, Rio Roberts, and Rio Beaver drainages.

Visual Quality Objectives

Adopted VQOs are a set of measurable goals for the management of visual resources within the Forest. They are based on a variety of physical and sociological parameters (see Table 3-30) and describe different degrees of acceptable alteration to the natural landscape. VQOs are Preservation, Retention, Partial Retention, Modification, and Maximum Modification (see *Key Terms* section for definitions).

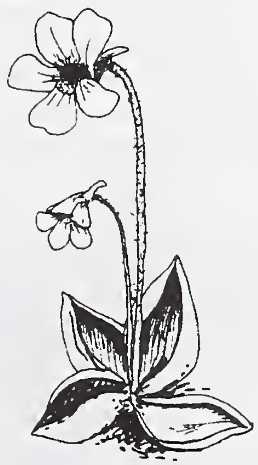


Figure 3-21
Sensitivity Levels in the Control Lake Project Area

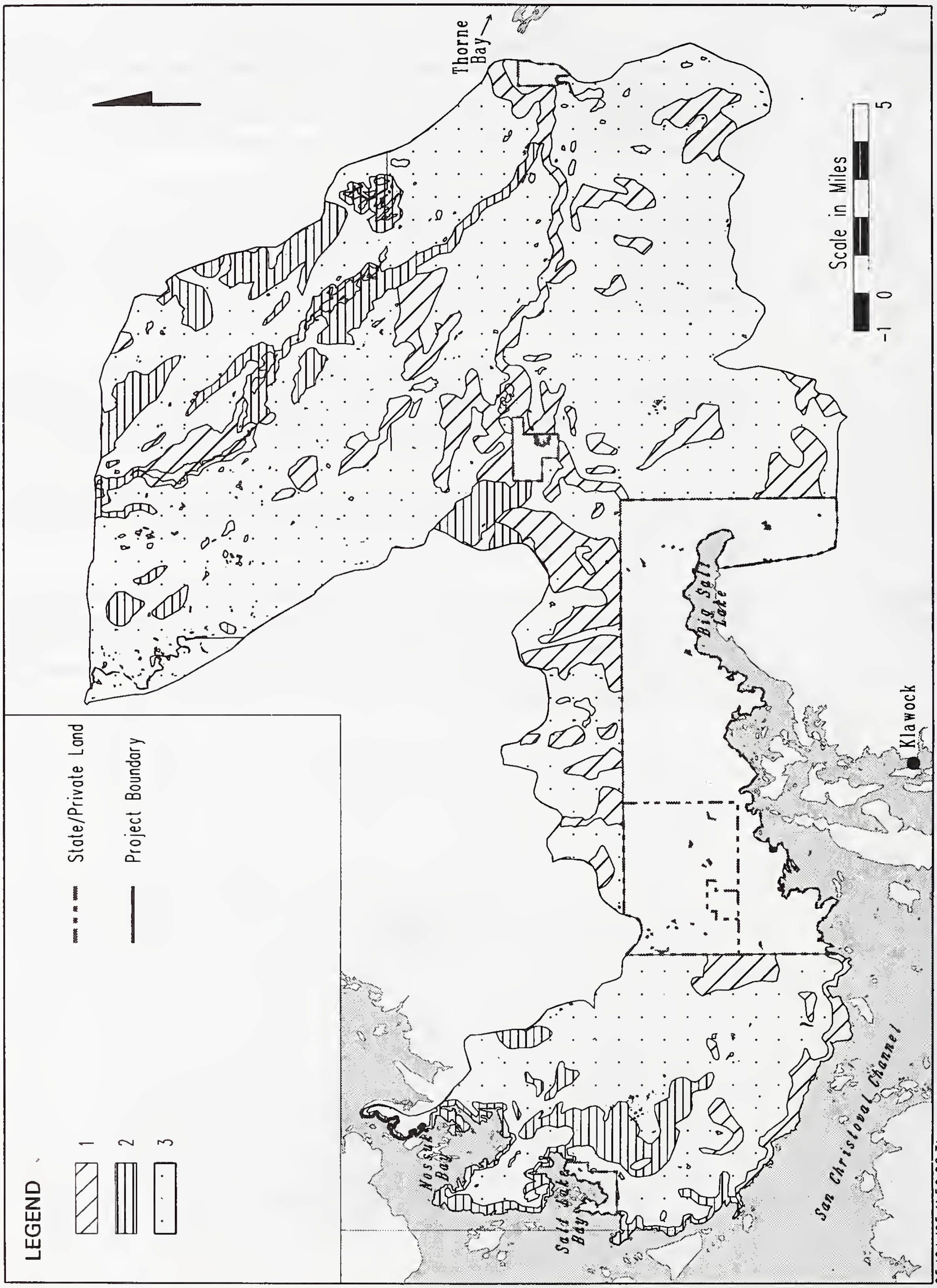


Table 3-30
Adopted Visual Quality Objectives for each Land Use Designation

LUD(s)	Distance Zone: Foreground	Middleground	Background	Not Seen
Research Natural Area	Retention VQO	Retention VQO	Retention VQO	Retention VQO
Semi-Remote Recreation	Partial Retention VQO	Partial Retention VQO	Partial Retention VQO	Partial Retention VQO
Scenic River	Retention VQO	Partial Retention VQO	Partial Retention VQO	Partial Retention VQO
Recreation River	Partial Retention VQO	Partial Retention VQO	Partial Retention VQO	Partial Retention VQO
Scenic Viewshed	Retention VQO	Partial Retention VQO	Partial Retention VQO	Maximum-Modfication VQO
Modified Landscape	Partial Retention VQO	Modification VQO	Modification VQO	Maximum-Modfication VQO
Timber Production	Modification	Maximum Modification VQO	Maximum Modification VQO	Maximum Modification VQO
Old-Growth Habitat	Retention VQO	Retention VQO	Retention VQO	Retention VQO

Figure 3-22 depicts Project Area VQOs. While Maximum Modification encompasses much (44.6 percent) of the area on National Forest System lands, significant portions of the Project are within Modification (5.8 percent), Partial Retention (15.3 percent), and Retention (38.6 percent). Foreground views from Cutthroat Lakes and middleground views from Control Lake/Balls Lake are within Partial Retention. All lands in the Semi-Remote Recreation LUD, which abuts the West Coast Waterway, are also within Partial Retention. Foreground and most middleground areas visible from the Scenic River portion of the Thorne River are within the Retention VQO. All lands in the Old-growth Habitat LUD, foreground views from Control Lake, and foreground views from Balls Lake are also within Retention. Areas seen from the Forest Highway #9 range from Retention to Partial Retention in the foreground and from Retention to Modification in the middleground.

Existing and Future Visual Conditions

EVC is a measurement of visual quality and visual effects of current management activities. EVC types range from natural (Type 1), where only ecological changes have occurred, to drastically altered (Type 6), where human-caused changes are in "glaring contrast" to the landscape's natural appearance. EVC Types 1 through 5 correspond to VQOs and may be defined as follows:

Figure 3-22
Visual Quality Objectives in the Control Lake Project Area

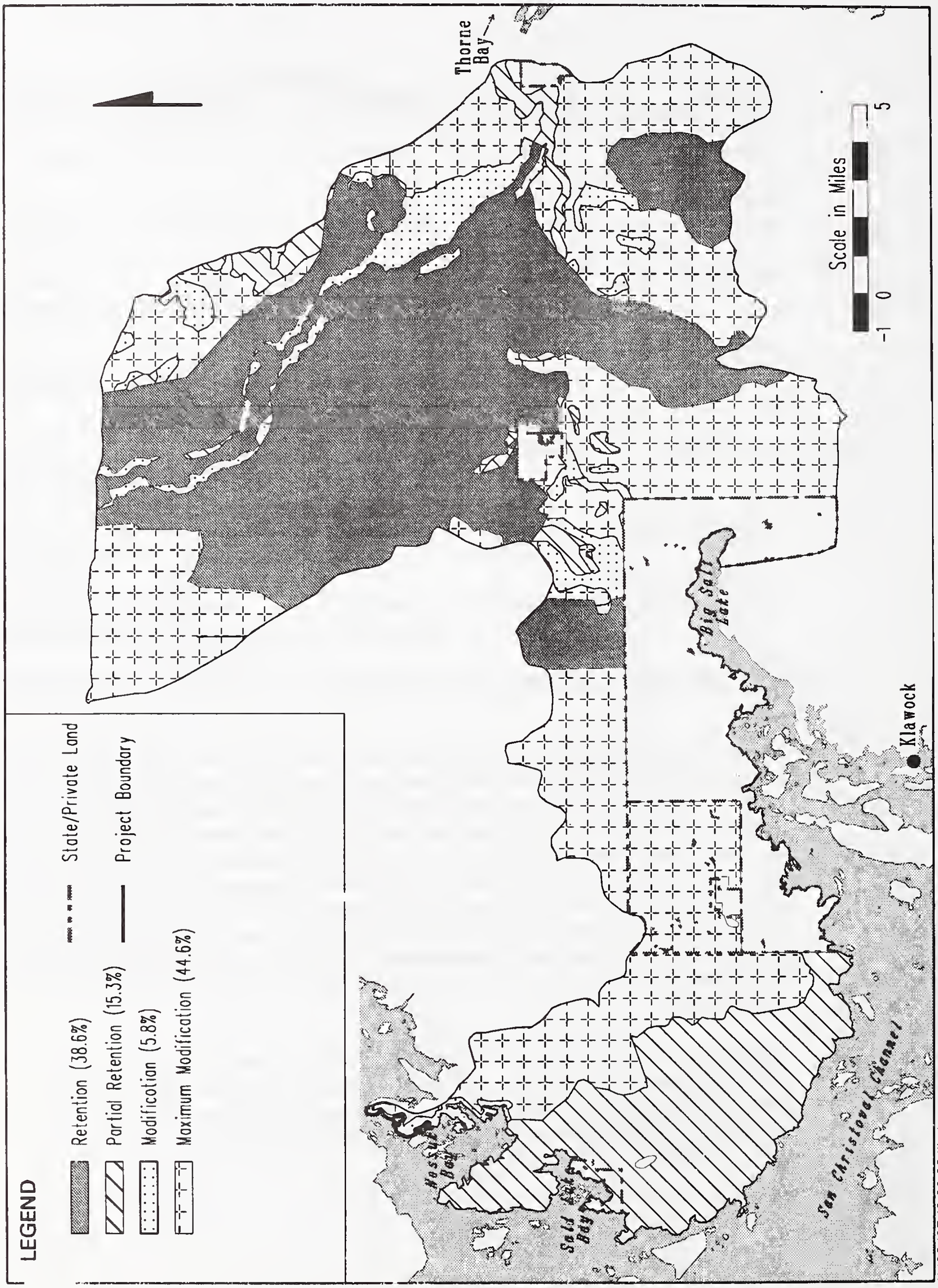
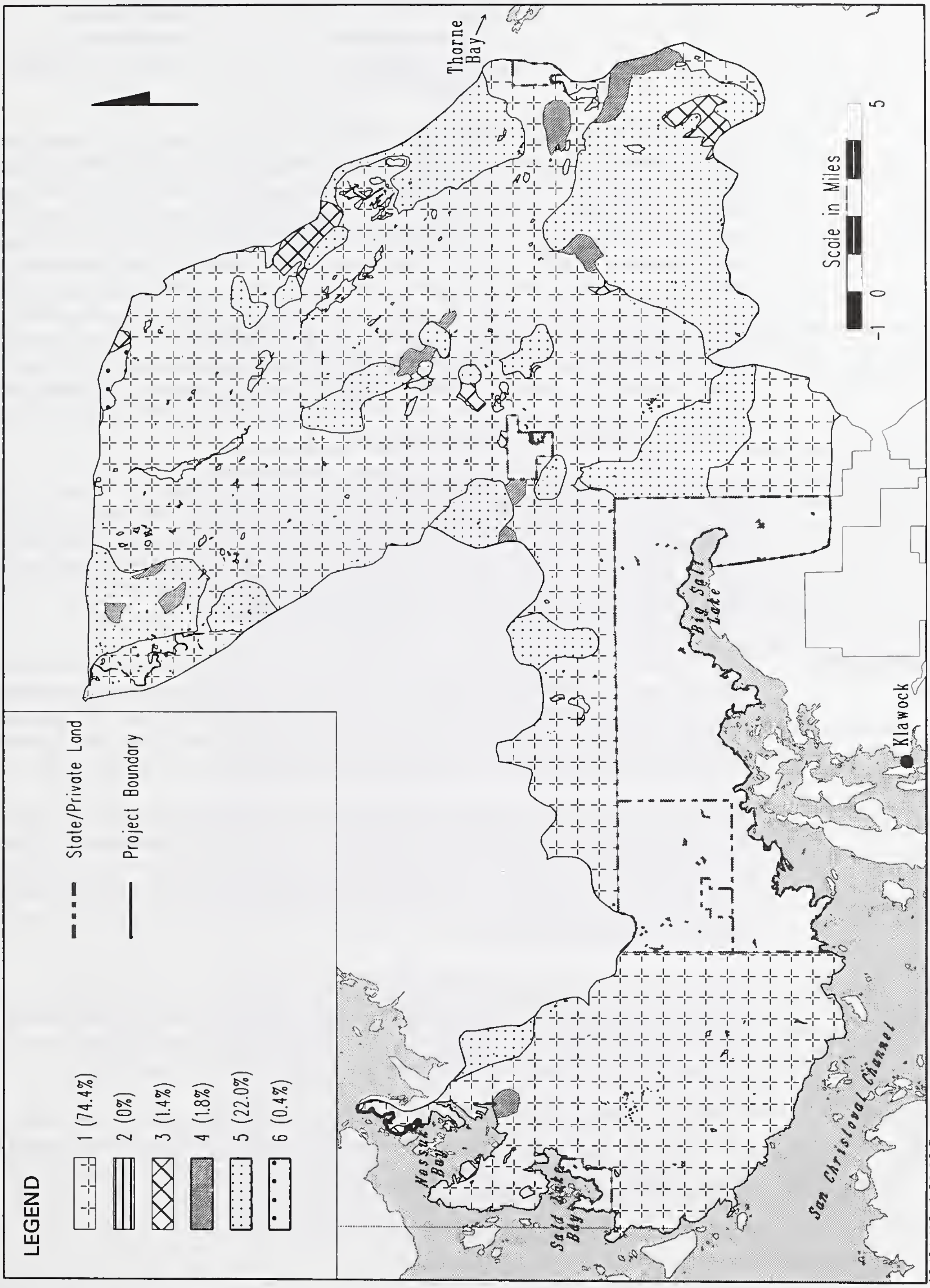


Figure 3-23
Existing Visual Conditions in the Control Lake Project Area



EVC Type	Visual Condition	Corresponding VQO
1	Natural	Preservation
2	Natural Appearing	Retention
3	Slightly Altered	Partial Retention
4	Moderately Altered	Modification
5	Heavily Altered	Maximum Modification
6	Drastically Altered	—

The percentage of the Project Area in each EVC type is shown in Figure 3-23. Large tracts appearing devoid of human activities (EVC Type 1) are presently associated with the Kogish Roadless Area in the western portion of the Project Area, Salt Lake Bay, much of the Thorne River drainage, and other locations in the southeast portion of the Control Lake Project Area. EVC Type 1 accounts for 74.4 percent of the Project Area on National Forest System lands. Heavy and excessive alteration (EVC 5 and 6, respectively) is currently seen on privately owned lands that surround Big Salt Lake adjacent to the Project Area boundary, lands south and west of the Community of Thorne Bay, along the eastern shore of Cutthroat Lakes, surrounding Lower Logjam Creek, areas adjacent to Snakey Lakes, isolated areas near Control Lake and Balls Lake, and other small portions of the Project Area. EVC Types 5 and 6 make up 22.0 and 0.4 percent, respectively, of the Project Area on National Forest System lands. The remainder (3.2 percent) of the area is slightly altered (EVC 3) to moderately altered (EVC 4). None of the Project Area has been classified as natural appearing (EVC 2).

The Future Visual Condition (FVC) represents the visual condition level that would occur at the end of a proposed activity period. Like EVC, it is measured in terms of Condition Types 1 to 6. When compared to EVC, the FVC serves: (1) to analyze the current management situation, (2) to estimate the effect of alternatives, (3) to facilitate visual monitoring, and (4) as a historical record of the degree and amount of physical alteration of the landscape over time and space. The FVC created by each proposed alternative will be analyzed in Chapter 4.

Visual Absorption Capability

VAC is defined by the Forest Service as the ability of the landscape to absorb management activities, such as timber harvest, without its visual character being significantly affected. In other words, VAC helps determine how easy (or difficult) it will be to achieve the Adopted VQO. The landscape slope, variety class, and distance zones are analyzed. When these parameters are overlayed with one another, areas of high, intermediate, and low VAC are identified.

Steep slopes, lack of visual variety, and proximity to areas of high visual sensitivity make several areas of the Project Area's landscape unable to easily absorb management activities (they exhibit low VAC). These areas, which total 8.3 percent of the Project acreage, include much of the West Coast Waterway shoreline, Control Lake, Balls Lake, Cutthroat Lakes, and the Thorne River. Much of the Project Area (77.7 percent) exhibits high VAC, with the remainder (14.0 percent) being medium VAC.

Cumulative Visual Disturbance

Adopted VQOs and VAC levels are combined by the Forest Service to establish guidelines for timber harvest planning. Cumulative Visual Disturbance (CVD), which suggests the maximum allowable percentage of a viewshed (or portion thereof) to be in a disturbed condition at any one time, has been addressed as part of the Control Lake Project planning effort.

Project Area Viewsheds

Viewsheds consist of landscapes seen from a specific viewpoint or series of viewpoints. To assess the potential effects of land management activities the Forest Service has identified Visual Priority Routes and Use Areas (1997 TLMP). Visual Priority Routes and Use Areas of concern to the Control Lake project include:

- Maurelle Islands Wilderness
- West Coast Waterway
- Communities of Craig and Klawock
- Waters around Craig and Klawock
- Control Lake Cabin Site
- Eagle's Nest Campground (Balls Lake)
- Cutthroat Lakes
- Thorne River/Honker Divide Canoe Route
- Thorne River Bridge
- Gravelly Creek Day Use Area
- Community of Thorne Bay
- Forest Highway #9

Figure 3-24 depicts these visual priority areas. For each priority travel route and use area viewshed, scenic quality, distance zone, EVC, and compliance with adopted VQOs are described below. Viewsheds that are significantly affected by the project alternatives are graphically portrayed in Chapter 4.

Maurelle Islands Wilderness—This 5,000 acre designated Wilderness Area is comprised of a series of small islands and associated waterways. The area is separated from the Control Lake Project by the Gulf of Esquibel. Views from Anguilla Island, Esquibel Island, and waters inside the Wilderness boundaries incorporate landforms in the western portion of the Project Area (Semi-Remote Recreation and Timber Production LUDs) as background elements. At this distance, the landscape appears as a series of undulating and overlapping horizontal ridgelines. Texture is indiscernible in this area of uniform tree cover. Visible portions of the Control Lake Project Area are of average (Variety Class B) and low (Variety Class C) scenic quality. No human-caused disturbance is evident and the areas appear natural (EVC 1). Adopted VQOs range from Partial Retention to Modification.

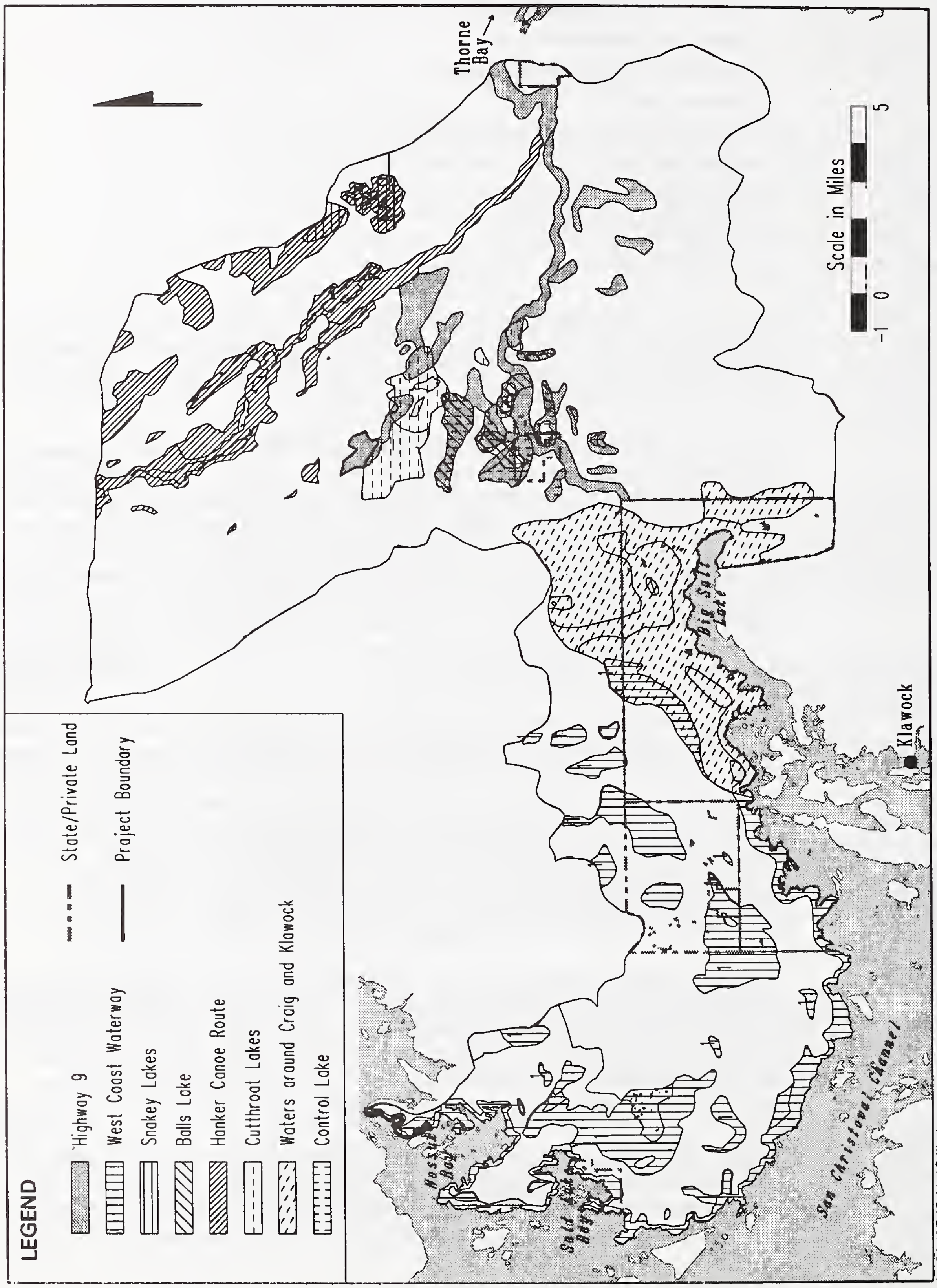
West Coast Waterway—This small boat route runs for more than 100 miles along the west side of Prince of Wales Island from Calder Bay in the north to Kaigani Strait in the south. Adjacent to the Control Lake Project Area, it makes use of Tonowek Bay, the Gulf of Esquibel, and San Christoval Channel. Anchorages exist at Nossuk Bay (described later), Salt Lake Bay (also described later), and near St. Philip Island. A potential dispersed campsite, identified by the Forest Service, exists along the Prince of Wales coast northwest of Rosary Island. The Project Area appears as gently to steeply sloping knobs and ridgelines. Areas visible in the middleground are continuously forested, with texture characterized by tree massings. Background slopes are more irregular in form and display little or no texture.

Areas north of Blanquizal Island are of average (Variety Class B) scenic quality, while areas to the south are of low (Variety Class C) scenic quality. South of Nossuk Bay and west of Sombrero Island, visible project lands are in the Semi-Remote Recreation LUD and have a Partial Retention VQO. Visible lands east of Sombrero Island and along the east shore of Nossuk Bay are in the Timber Production LUD. Here, the VQOs range from Modification to Maximum Modification. The present visual condition of the this coastline is natural (EVC 1).

Adjacent to the West Coast Waterway small boat route in the northwest portion of the Project Area is Nossuk Bay. Three existing anchorages and a moorage buoy provide shelter for boaters. Nossuk Bay users may obtain foreground and middleground views of portions of the Project Area that are in the Semi-Remote Recreation and Timber Production LUD. The entire

Figure 3-24

Visual Priority Area Viewsheds in the Control Lake Project Area



area surrounding the Bay is of average (Variety Class B) scenic quality. Partial Retention, Modification, and Maximum Modification VQOs have been adopted. Past harvest activity is evident along the south shore of the Bay in the foreground and at the head of the Bay in the middleground. The visual condition ranges from natural (EVC 1) to moderately altered (EVC 4).

Salt Lake Bay is adjacent to the West Coast Waterway and south of Nossuk Bay. Two existing anchorages provide shelter for users of the small boat route. A potential recreation shelter location has also been identified near the north entrance to the Bay. The State of Alaska has proposed the selection of 917 acres at Salt Lake Bay for a prospective community. Settlement is expected because of the area's access to commercial fishing grounds, growth in commercial recreation, and proximity to timber harvest areas and to the city of Craig. Salt Lake Bay is used extensively by Craig and Klawock residents for community recreation. From the Bay, which is surrounded by a Semi-Remote Recreation LUD, views incorporate continuously forested lands with average (Variety Class B) scenic quality. A Partial Retention VQO has been adopted for this land, which may be characterized as natural (EVC 1).

Communities of Craig and Klawock—The community of Klawock is immediately south of the Project Area on the west coast of Prince of Wales Island. Five miles south of Klawock is the City of Craig. Extensive timber harvest has occurred on privately owned land adjacent to the community and along the perimeter of Big Salt Lake.

Because Craig and Klawock are well outside the boundaries of the Control Lake Project, proposed management activities would have no direct visual impact. However, residents and visitors to these communities often travel through and recreate within the Project Area. Any visual impact on priority travel routes and use areas will, therefore, be felt indirectly within Craig and Klawock.

Waters around Craig and Klawock—San Alberto Bay, Shinaku Inlet, Klawock Inlet, and Big Salt Lake are near the communities of Craig and Klawock. Lands immediately adjacent to the waterbodies are outside the Control Lake Project boundaries and are privately owned. Portions of the Project Area are visible in the middleground distance zones north of Big Salt Lake. These lands are in the Timber Production, Modified Landscape Scenic Viewshed, and Old-growth LUDs. VQOs of Retention, Partial Retention, Modification, and Maximum Modification have been adopted for these National Forest System lands. They are of average scenic quality (Variety Class B) and natural visual condition (EVC 1).

Privately owned land in the foreground distance zone has been extensively harvested. A small amount of logging is also visible on Forest System lands in the Middleground. San Alberto Bay, Shinaku Inlet, and Klawock Inlet receive heavy recreational use by residents of Craig and Klawock. Two existing recreation sites exist along the shoreline of Klawock Inlet, just south of the community bearing the same name. Big Salt Lake receives little recreational use. A boat ramp, accessible via State Highway 929, exists near the head of Big Salt Lake. It is maintained by the State of Alaska. Because they are non-Forest System lands, no LUDs, VQOs, or EVC types have been prescribed for the shores of San Alberto Bay, Shinaku Inlet, Klawock Inlet, or Big Salt Lake. However, it should be noted that the size and extent of the previous harvest is poorly related to the natural landscape. In addition, logging roads have failed throughout the seen area on these private lands. Because the continually moving soils prevent revegetation, erosion will be apparent for an extended period of time.

Control Lake Cabin Site—This recreation area is about 20 miles west of Thorne Bay and 18 miles northeast of Klawock. A Forest Service skiff and dock along the west shore of the lake is easily accessed from the Forest Highway #9. It provides transportation to and from the cabin on the lake's north shore. En route, panoramic views of the Thorne Mountains are available to those looking north. Similarly, the Klawock Mountains are visible to the south. Views from the cabin are oriented south across Control Lake and punctuated by the snow-capped peaks around Black Bear Lake (outside the Project Area) in the background. In the foreground distance zone that surrounds the lake the landscape is fairly flat, continuously wooded, and coarsely textured by individual tree boughs. Middleground areas are also continuously wooded. However, these areas are more steeply sloped and display a finer texture created by tree massings.

The State of Alaska previously made a land selection for community development at the main junction of Forest Highway 9, and Forest Roads 20 and 30. This selection has been expanded to include land for commercial development, public facilities, and community recreation. Pleasant views, sportfishing opportunities, and the cabin make this an important recreation site for the communities of Thorne Bay, Craig, and Klawock.

The Thorne Mountains, which are visible north of the lake, are highly scenic (Variety Class A), while the remainder of lands visible are of average (Variety Class B) scenic quality. It is the intent of the Forest Service to include all lands visible from the lake and cabin in a Scenic Viewshed LUD. As a result, the Retention and Partial Retention VQOs have been adopted. While automobiles can be heard traveling along Forest Highway #9, which parallels the Lake's western and northern shore, the roadway is screened from view. As seen in planimetric view (see Key Terms) small, heavily altered (EVC 5) areas exist in the middleground to the east and west of Control Lake. However, as seen in perspective view (see *Key Terms*) these areas meet the adopted Partial Retention VQO. The remainder of the visible area is natural (EVC 1) and complies with adopted VQOs.

Eagle's Nest Campground (Balls Lake)—This developed recreation facility is accessible from Forest Highway #9, approximately 18 miles west of Thorne Bay and two miles east of the Control Lake junction. The site is also near the communities of Craig (25 miles) and Klawock (20 miles). The campground is nestled along the shore of Balls Lake in the foothills of the Thorne Mountains. There are eleven camp units, vault toilets, and potable water. The area has been deemed wheelchair accessible. In addition to camping, Eagle's Nest provides a boat launch and boardwalk that now parallels the lake shoreline for 1,800 feet. This boardwalk is to be extended in the near future.

Expansive views of the Thorne Mountains and surrounding foothills are available from the campground, boardwalk, and lake. Scenic quality is high (Variety Class A) to the north, west, and east of the lake. The foreground distance zone surrounding the lake is continuously forested and dominated by the texture of individual trees. Steeply sloped and heavily dissected landforms dominate the middleground, which is also continuously forested. Middleground slopes visible south of the lake are more uniform in appearance and of average (Variety Class B) scenic quality. It is the intent of the Forest Service to include all land visible from the campground, boardwalk, and lake in a Scenic Viewshed LUD. As a result, the Retention and Partial Retention VQOs have been adopted. The vast majority of the seen area is natural (EVC 1). As seen in planimetric view, a small portion of land east of the lake in the middleground is heavily altered (EVC 5). However, as seen in perspective view, this past harvest activity is subordinate to the characteristic landscape and meets its adopted Partial Retention VQO.

Cutthroat Lakes—This recreation site, which comprises two adjacent lakes, is about two miles north of Balls Lake. Recent harvest activity has resulted in development of a road to the east side of the area. This road is currently closed with a gate.

The lakes lie at the dividing line between two distinct scenic quality types. To the south and west are the very steep and dissected landforms of the Thorne Mountains, which are high (Variety Class A) in scenic quality. To the north and east is the more rolling terrain of the

Thorne River drainage. It is of average (Variety Class B) scenic quality. All areas seen from the Cutthroat Lakes are in the Old-Growth Habitat LUD and, therefore, have a VQO of Retention. As mentioned, recent timber harvests have taken place east of the lower lake. As seen in planimetric view, this portion of the seen area is in a heavily altered (EVC 5) visual condition. As seen in perspective, where vegetation along the water's edge screens portions of this harvest activity, the area achieves a Modification VQO. The remainder of the seen area is natural (EVC 1) and meets the adopted Retention VQO.

Thorne River/Honker Divide Canoe Route—Abundant recreational opportunities make this lake-stream system, which lies in the eastern portion of the Project, a use area of local and regional importance. Part of a moderately used saltwater-to-saltwater canoe route between Thorne Bay and Coffman Cove, the Project Area includes the following components of the Honker Divide Canoe Route: Butterfly Lake, Lake Galea, Twin Lake, Thorne Lake, and Snakey Lakes. An existing recreation cabin at Lake Galea provides a convenient layover for canoeists. Potential recreation shelter locations have been identified on the Thorne River near Cutthroat Creek, the island in upper Thorne Lake, and the east shore of lower Twin Lake. A potential dispersed campsite has also been located at the north end of Butterfly Lake, just outside the Project Area. Associated with the Honker Canoe Route are camping, fishing, and wildlife viewing under primitive conditions in a natural-appearing environment.

Much of the Thorne River corridor is of average scenic quality (Variety Class B) and within the Scenic River LUD. The area nearest Thorne Bay is in the Recreation River LUD. Retention and Partial Retention VQOs apply to all seen areas within these two LUDs.

Shorelines and ridgelines give the landscape a horizontal orientation, although strong vertical lines are seen in foreground tree trunks. The gray-green of the spruce-hemlock forest is the dominant color. It is punctuated by the dark blues of the lakes and yellow-greens of herbaceous cover. Texture is the dominant element in this landscape. The homogenous vegetation provides a coarse texture that diminishes with distance. The existing visual condition of landscapes seen from the River and associated waterbodies within the Project Area is predominantly unroaded and natural (EVC 1). Portions of the Butterfly Lake viewshed north of the Project Area have been heavily altered. A small area of recent logging is visible southeast of Twin Lake and northeast of Thorne Lake in the middleground. As seen in planimetric view, this area is heavily disturbed (EVC 5). One recently harvested unit is also visible to the southwest of Lake Galea in the middleground. As seen in perspective view, existing harvest activities within the Project Area portion of the Thorne River corridor are minor disturbances. However, they do not meet the adopted Retention VQO.

Aerial view of Lake Galea looking north

Snakey Lakes includes a portion of the North Thorne River, which meanders through mature timber and muskegs in a serpentine fashion. In places, the stream broadens to form small lakes. The variety of landform, waterform, and vegetation give the Snakey Lakes a high (Variety Class A) scenic quality. While large volumes of timber have been harvested adjacent to the Snakey Lakes and the area is encircled by roads (EVC 5), little of this development is visible from the waterbodies themselves, due to the flat slopes and screening vegetation. The vast majority of seen areas are in a natural (EVC 1) condition and comply with the adopted Retention VQO. All areas seen from Snakey Lakes are in the Scenic River, Old-growth, and Scenic Viewshed LUDs.

Thorne River Bridge—This popular fishing spot is located where Forest Road #30 crosses the Thorne River, about six miles west of Thorne Bay. No developed recreation facilities exist. Views are comprised of land in the Recreation River LUD and are restricted by mature vegetation lining the river in the foreground and near-middleground distance zone. Scenic quality is average (Variety Class B). While the bridge itself slightly alters the characteristic landscape

(EVC 3), views upstream and downstream are natural (EVC 1). Adopted VQOs range from Partial Retention to Modification.

Gravelly Creek Day Use Area—This developed recreation area is located on gently sloping terrain, four miles west of Thorne Bay on Forest Road #30. A picnic shelter, parking area, fire rings, outhouse, and short trail are provided. This popular site faces the Thorne River and is utilized by local residents, as well as tourists. Views are oriented south and entirely foreground in nature. Mature spruce, hemlock, and cedar in the river corridor give the area coarse texture and block views of the surrounding landscape in the eligible Recreation LUD. Scenic quality is average (Variety Class B). While the recreation facilities slightly alter the characteristic landscape (EVC 3), the surrounding areas appear natural (EVC 1). The adopted VQO is Partial Retention.

Community of Thorne Bay—Established in 1962 when Ketchikan Pulp moved its main logging camp from Hollis, Thorne Bay is located outside the Project Area on the east coast of Prince of Wales Island. It has evolved from a company-owned logging camp into an incorporated community. The Project Area is not visible from the community. However, residents and visitors travel through and recreate within the Project Area. Therefore, any visual impact to Priority Travel Routes and Use Areas will be felt indirectly in Thorne Bay.

Forest Highway Corridor—Forest Highway #9 runs from Klawock to the Control Lake junction, and Forest Road 30 continues from the junction to Thorne Bay. This viewshed overlaps with several of the Priority Travel Routes and Use Areas described above. Scenic quality is average in areas immediately adjacent to the highway. In some areas, extensive middleground views of the project area are available. The highway traverses the Old Growth, Scenic Viewshed, Modified Landscape, and Recreation River LUDs. All suitable timber harvest lands visible from the highway are intended for inclusion in the Modified Landscape LUD.

Thorne River looking North from Forest Road #30 bridge

Between Klawock and a point approximately 3 miles south of the Control Lake junction, the corridor is dominated by privately-owned timberlands. Timber harvest activity is evident in many foreground and middleground views. Partial Retention and Modification VQOs have been adopted for National Forest System lands within the middleground distance zones in this area. Foreground seen areas have the Partial Retention VQO.

In the vicinity of the Control Lake junction, the corridor provides views of the Thorne and Klawock mountains to the north and south, respectively. Foreground and middleground distance zones are continuously wooded. State selected land located at the junction is presently undeveloped, but is reserved for possible future community development. Retention, Partial Retention, and Modification VQOs have been adopted.

From the Control Lake intersection east to Thorne Bay, the corridor passes through predominantly natural areas in the foreground and middleground distance zones. The seen area varies from mature forest to open muskegs, and includes views of the Thorne River, several smaller rivers and streams, and the drumlins of the Thorne River corridor. Adopted VQOs range from Retention to Modification.

Recreation, Roadless Areas, Wild and Scenic Rivers, and Wilderness Areas

Key Terms

Developed recreation—that type of recreation that occurs where more facilities and amenities are incorporated into a site to accommodate intensive recreation activities in a defined area.
Dispersed recreation—that type of recreation use that requires few, if any, improvements or specific developed sites, and may occur over a wide area. This type of recreation involves activities related to roads, trails, and undeveloped waterways and beaches.
Recreation Opportunity Spectrum (ROS)—a system for planning and managing recreation resources that categorizes recreation opportunities into six classes. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs.
Recreation place—an identified geographic area having one or more physical characteristics that are particularly attractive to people engaging in recreation activities; can contain from zero to several recreation sites.
Recreation site—specific location or site where recreational activities occur and/or a recreational facility is located; smaller in area than a recreation place.
Recreation Visitor Day (RVD)—a measure of recreation use of an area. One recreation visitor day consists of recreation use of a site or area by one person for 12 hours; can be abbreviated as "visitor day."
Roadless area—an area of undeveloped public land within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use.
Service Day—a day or any part of a day for each individual or client accompanied or provided services, including transportation services, by an outfitter or guide.
Wild and Scenic River—rivers or sections of rivers designated by congressional action under the 1968 Wild and Scenic Rivers Act or by an act of the Legislature of the state or states through which they flow.
Wilderness—areas designated by congressional action under the 1964 Wilderness Act or by TTRA and/or ANILCA; undeveloped federal land retaining its primeval character and influence without permanent improvements or human habitation.

Introduction

Prince of Wales Island plays an important role in Southeast Alaska by providing settings for various types of outdoor recreation—viewing scenery, boating, fishing, hunting, and hiking. Timber harvest has opened over 1,500 miles of road throughout the island to the general public. This high degree of accessibility creates many opportunities for roaded recreational activities and sets the island apart from most other areas of Southeast Alaska.

Limited timber harvest has occurred in the Control Lake Project Area, making it less accessible by road than other parts of the island. State Highway 929 enters the Project Area from Klawock and intersects with Forest Roads 20 and 30 near Control Lake. Forest Road 30 provides access to Thorne Bay and several popular recreation sites such as Control Lake, Eagle's Nest Campground, and the Thorne River. Other forest roads, such as Forest Road 3015 and a number of newer roads, provide access to parts of the Project Area.

Most of Prince of Wales Island is contained in two Forest Service ranger districts within the Ketchikan Area of the Tongass National Forest. The Craig and Thorne Bay Ranger Districts contain virtually all of the island's public recreational facilities, including over 20 recreation cabins and shelters, one developed campground, dispersed camping areas and several developed day use/picnic areas, and approximately 20 miles of maintained trails. The Project Area is located in the Thorne Bay Ranger District in central Prince of Wales Island.

Recreation Opportunity Spectrum

The Forest Service developed the ROS system to help identify, quantify, and describe the variety of recreation settings available in National Forests. The ROS system provides a framework for planning and managing recreation resources. The ROS settings are classified using a scale ranging from primitive to urban. Seven elements are used to determine where the setting belongs on the scale:

- **Visual Quality**—the degree of apparent modification of the natural landscape.
- **Access**—the mode by which activities are pursued and how well users can travel to or within the setting.
- **Remoteness**—the perceived separation of the setting from evidence of other human activity or structures.
- **Visitor Management**—the degree and appropriateness of how visitor actions are managed and serviced.
- **On-site Recreation Development**—the degree and appropriateness of recreation facilities provided within the setting.
- **Social Encounters**—the degree of solitude or social opportunities provided.
- **Visitor Impacts**—the degree of impact on both the attributes of the setting and other visitors within the setting.

Based on these seven elements, the Forest Service assigns one of six ROS settings zones to all Forest Service land. Five of the settings are found in the Project Area and are described below.

Primitive: An essentially unmodified natural environment of fairly large size. Interaction between users is very low, and evidence of other users is minimal. Motorized use is generally not permitted.

Semi-Primitive Nonmotorized: A natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. Use of local roads for recreational purposes is not allowed.

Semi-Primitive Motorized: A natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. Local roads used for other resource management activities may be present.

Roaded Natural: A natural-appearing environment with moderate evidence of the sights and sounds of humans. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high with evidence of other users prevalent. Motorized use is allowed.

Roaded Modified: A natural environment substantially modified particularly by vegetation and landform alterations. There is strong evidence of roads and/or highways. Frequency of contact is low to moderate.

Project Area ROS

This EIS assumes that all the proposed harvest units in the 1989-1994 operating plan were cut. Thus, the description of the existing condition of the recreation resource is based on what the mix of ROS settings would be upon completion of the 1989-1994 timber harvest. Implementation of the Central Prince of Wales project (adjacent to the Control Lake Project) will have very little effect on ROS settings in the Project Area. Most of the Central Prince of Wales harvest units that will be located near the Project Area boundaries will occur in areas that have been previously harvested and roaded. Many of the new units will be located between old units. As a result, existing ROS settings in the Project Area will not change significantly as a result of harvesting associated with Central Prince of Wales.

The vast majority (85 percent) of the Project Area is included within two ROS settings—Semi-Primitive Nonmotorized (SPNM) and Roaded Modified (RM) (Figures 3-25 and 3-26). The SPNM setting is the most extensive, accounting for 57 percent (97,754 acres) of the total Project Area. There are several distinct areas of SPNM separated by areas of RM (Figure 3-26). These include a large strip in the western section of the Project Area located between the coastal strip of Semi-Primitive Motorized (SPM) and a band of RM, a block on the north edge of the middle section that includes the Shinaku Creek drainage and lakes, and an area that wends its way through much of the eastern portion of the Project Area beginning north of State Route 929 and continuing along the Thorne River past Thorne Lake to Twin Lakes and east and north to the Project Area boundary. This block, constituting almost half of the total SPNM area (approximately 42,000 acres), contains much of the Thorne Mountains and Upper Cutthroat Lake. Other SPMN areas are located south of Control Lake, three areas north of and adjacent to the Karta Wilderness, and a sizable area around upper Steelhead Creek.

The RM class is the second largest in the Project Area (49,205 acres) (Figure 3-25). The areas are generally found where timber management activities have occurred. The largest RM setting (approximately 14,900 acres) is in the southeast corner of the Project Area between Forest Road 20 to the north and the Karta Wilderness to the south. Two RM settings are near Honker Divide. Another large RM setting (12,200 acres) can be found in the western section of the Project Area encompassing an unnamed creek drainage and the Nossuk Creek drainage. Most of the Sealaska land adjacent to the south edge of the central Project Area is classified as RM.

The Project Area contains one contiguous 11,720-acre Primitive setting that surrounds Lake Galea. There has been no timber harvest or road development in the setting.

One Roaded Natural (RN) setting of 6,964 acres exists in the Project Area in the central eastern section. The setting is a narrow (1/2- to 1-mile-wide) strip paralleling the Thorne Bay and Big Salt roads from the eastern edge of the Project Area, past Balls and Control lakes, and southwest approximately 3 miles to the Forest boundary.

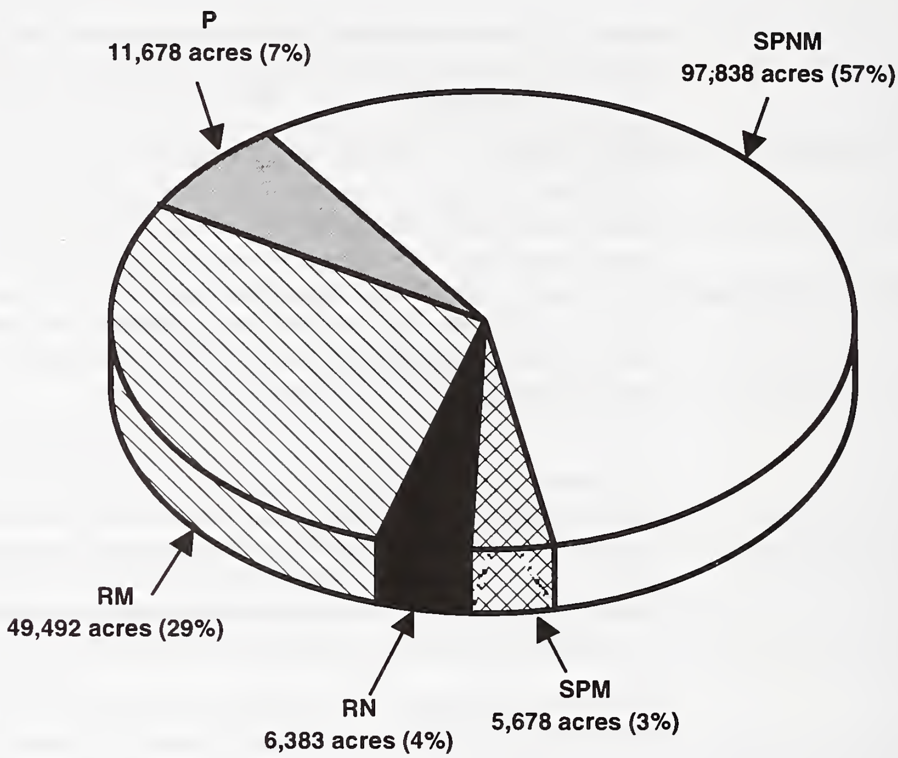
There is one SPM setting of approximately 6,267 acres in the Project Area. It is roughly 1/3- to 1 mile wide and runs along the west coast beginning at Nossuk Bay and continues south approximately 15 miles to Elevenmile Creek.

Recreation Places

Recreation Places (RPs) are general areas used for recreation activities. Activities in such places can be concentrated at specific Recreation Sites or dispersed throughout the RP. Because the majority of the Tongass National Forest is undeveloped, it is primarily used for dispersed recreation activities. Viewing scenery and wildlife, boating, fishing, beachcombing, hiking, and hunting are the primary dispersed recreation activities of resident users. Access is key to how outdoor recreation resources are used. RPs easily reached by car have higher visitation rates than those located in remote, roadless areas. Access to recreational resources in the Tongass is typically by boat or by motor vehicle on community or forest roads.

The ROS setting of RPs largely determines their attractiveness and utility. Many recreation opportunities, such as viewing scenery, require a natural type of ROS setting; other activities such as hunting and fishing may not directly depend on the setting. The locations of RPs within the Project Area are illustrated in Figure 3-27. Table 3-31 describes the RPs located in the Project Area.

Figure 3-40
Acreage of ROS Settings in Control Lake Project Area



SOURCE: Forest Service 1992b.

Note:			
	R	=	Roaded
	RN	=	Roaded Natural
	RM	=	Roaded Modified
	SPNM	=	Semi-Primitive Non-Motorized
	SPM	=	Semi-Primitive Motorized
	P	=	Primitive (unmodified natural environment)

Types of activities that occur in RPs in the Project Area can be grouped into three general categories based on the physical setting required for the activity—freshwater, land-based, and marine.

Freshwater-based Recreation

The abundance of lakes, rivers, and streams on Prince of Wales Island generally, and in the Control Lake Project Area specifically, provides numerous recreational opportunities. The most popular activities with recreationists are those that can be conducted near communities that are accessible by roads, trails, or boats. These activities include fishing, boating, kayaking,

Figure 3-26
Map of ROS Settings

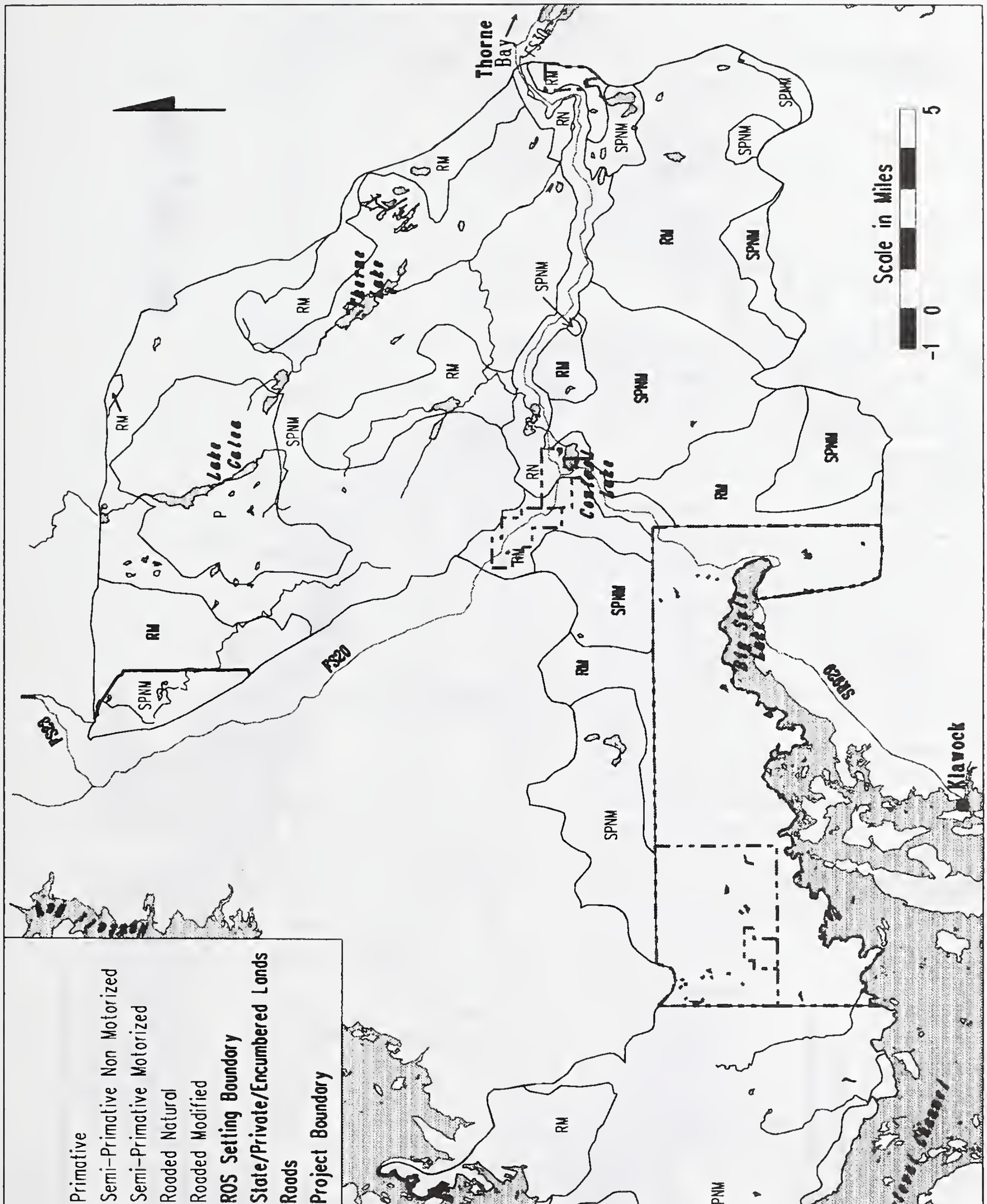


Figure 3-27
Recreation Places

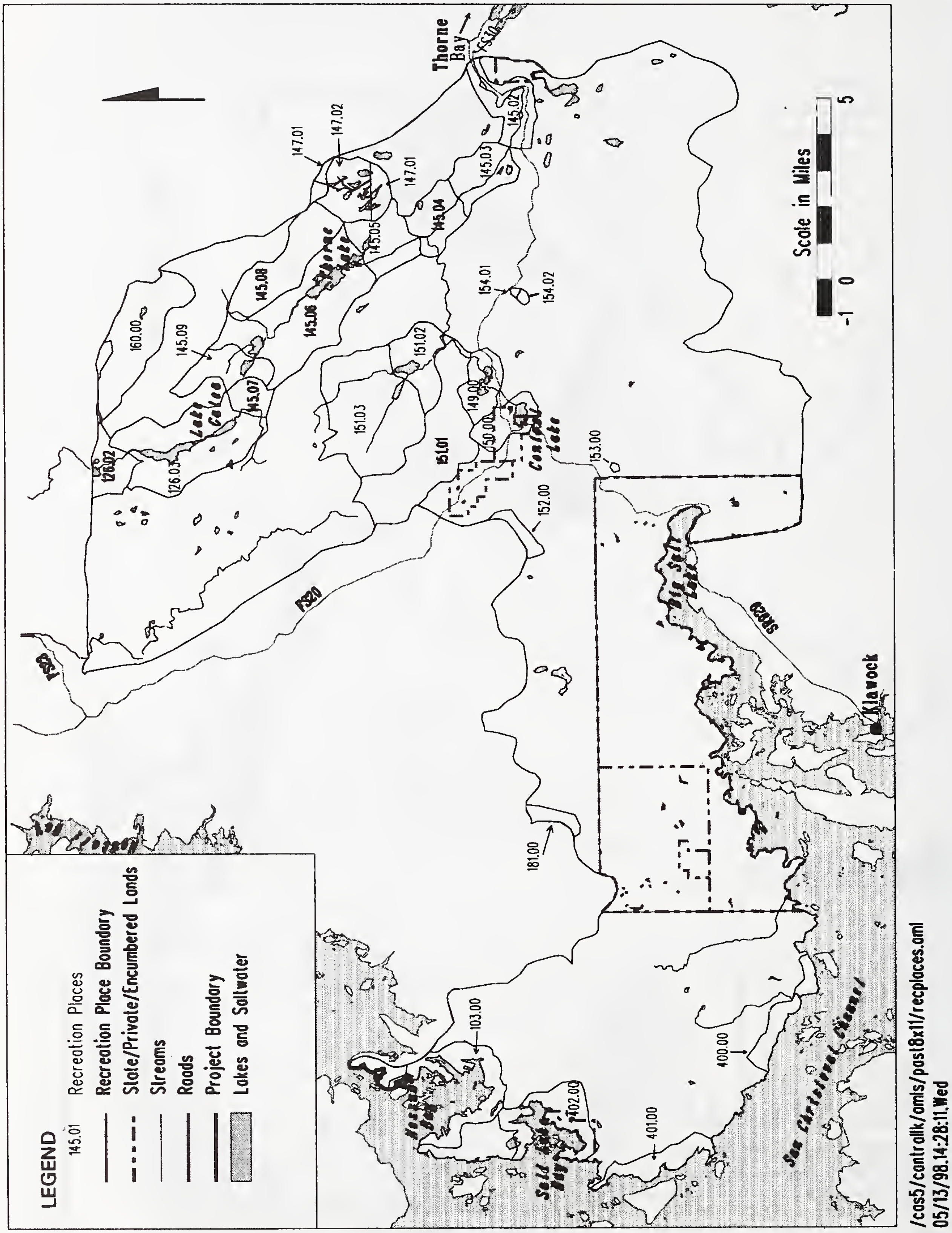
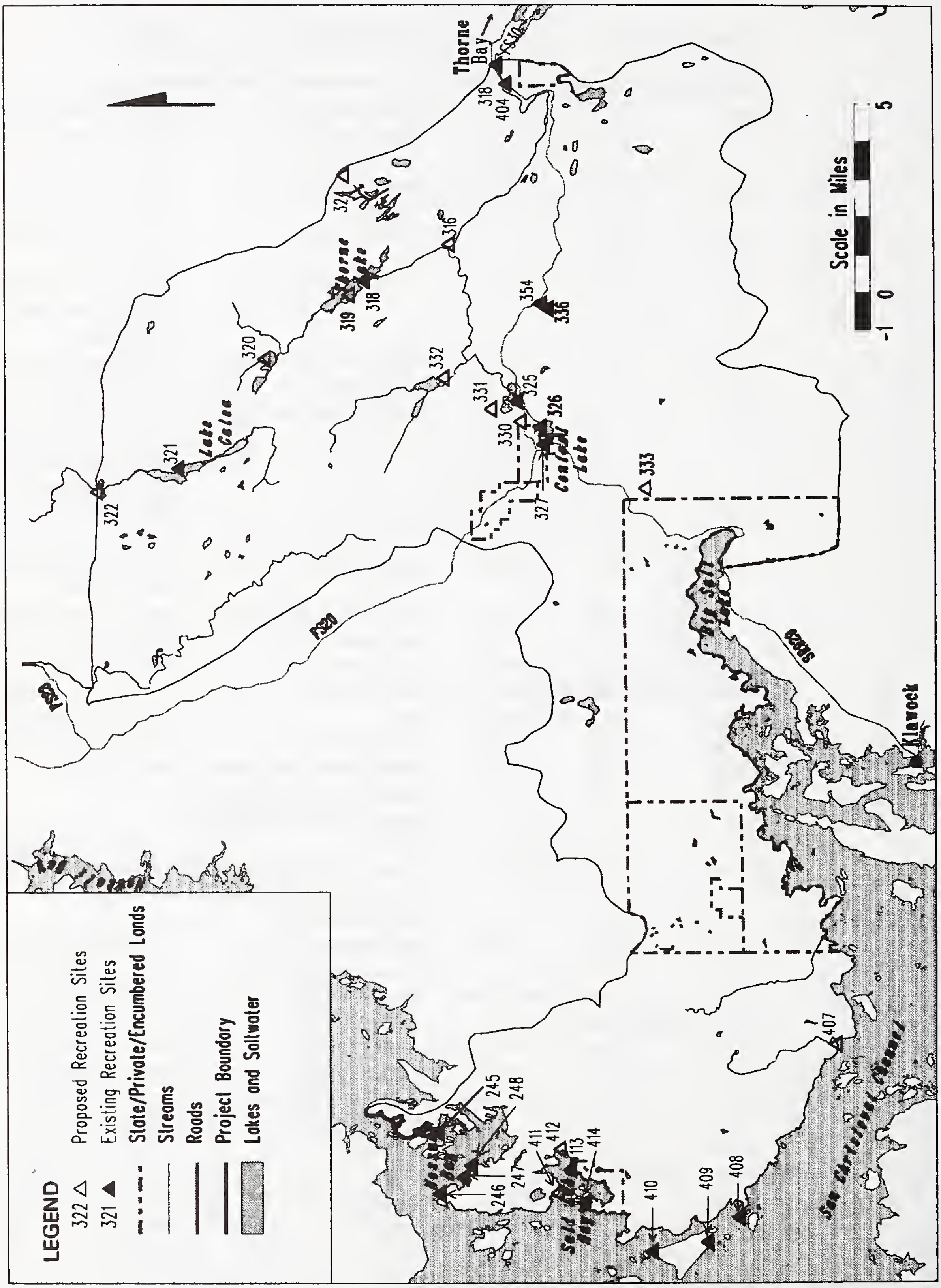


Table 3-31
Control Lake Project Area Recreation Places and Sites

Recreation Place	Acres	ROS Class	Activities/Features	NOTES
FRESHWATER BASED RECREATION—Thorne River/Hatchery Creek Corridor				
145.02	1537	RN	Canoe/kayaking, stream fishing, picnicking	Area of confluence of Gravelly and Goose Creeks with Thorne River
145.03	1385	SPNM	Canoe/kayaking, stream fishing	Area of Lower section of Thorne River
145.04	1332	"	Recreation shelter	Thorne River near Cutthroat Creek
145.05	1540	P	Canoe/kayaking, hiking	Area along Thorne River, west of Snakey Lakes, Upper Thorne River portage
145.06	4917	SPNM	Canoe/kayaking, developed camping, fishing	Area including Thorne Lake and Lower Twin Lake
145.07	647	P	Canoe/ kayaking, hiking	Honker Divide (and portage) and area adjacent to Thorne River north of Twin Lake and Lake Galea (Honker Lake)
145.09	1256	P & SPNM	Big game hunting	Upper Twin Lake and ridge to north
126.02	967	SPNM	Canoe/kayaking	Area around Butterfly Lake, on project boundary
126.03	4162	P	Canoe/kayaking, rec. cabin use, power boat use	Area around Lake Galea (Honker Lake)
147.01 & 147.02	1298	SPNM	Canoe/kayaking	Snakey Lakes area
FRESHWATER BASED RECREATION—Outside of Corridor				
154.01	35	RN	Trail	Rio Roberts Creek and trailhead
054.02	63	SPNM	Minor interpretive site	Rio Roberts Creek and trail area
149.00	1085	RN	Viewing scenery, hiking, canoe/ kayaking, lake fishing, developed camping, ice skating, interpretive site	Balls Lake area
150.00	1077	RN	Viewing scenery, lake fishing, rec. cabin use, ice skating, snow/ice play, power boating	Control Lake area
151.02	1477	SPNM	Hiking, big game hunting, camping, canoe/kayaking	Lower Cutthroat Lake area
151.03	4805	SPNM & RM	Big game hunting	Upper Cutthroat Lake area
LAND BASED RECREATION				
145.08	2414	RM	Big game hunting	Ridge east of Thorne Lake
160.00	3010	SPNM	Big game hunting	East of RP 145.08
151.01	4083	SPNM & RN	Hiking, dispersed camping, big game hunting, upland bird hunting	Thorne Mountain area
153.00	31	RM	Observation	Area south of Control Lake
MARINE BASED RECREATION				
400.00	910	SPM	Dispersed camping	Area northwest of Rosary Island
401.00	1023	SPM	Anchorage	Area across channel from Philips Island

Figure 3-28
Recreation Sites



wildlife viewing, and camping. The most sought-after settings at freshwater-related RPs are those that provide opportunities for: (1) getting away (solitude), (2) enjoying natural and scenic settings, (3) fishing for a diversity of species, and (4) good airplane access (USDA Forest Service, 1986).

The Project Area contains more recreation places associated with freshwater-based recreation (18) than with marine-based (5) and land-based (4) combined. Freshwater-based RPs within the Project Area can be broken down into those associated with the Thorne River/Hatchery Creek Corridor, and those located outside the corridor.

Thorne River/Hatchery Creek Waterway

The lower section of the Thorne River is especially popular with anglers and floaters who can access the river via road and put in at 8½ Mile or Goose Creek. The rest of the waterway receives much less use.

The Thorne River/Hatchery Creek Waterway is a significant local and regional recreational resource that is receiving national attention. The corridor is popular among local anglers and boaters because of the rich recreation opportunities offered by the Thorne River and Hatchery Creek. It is also becoming more popular among non-local recreationists.

The Thorne River/Hatchery Creek Waterway is part of the largest stream system on Prince of Wales Island. It supports wild fall and spring steelhead, coho, sockeye, and pink salmon; cutthroat and rainbow trout; and Dolly Varden char (Hoffman, 1991). The ADF&G has identified the Thorne River as one of 19 blue-ribbon fishing streams in Southeast Alaska (personal communication, J. Gustafson, area habitat biologist, ADF&G, Ketchikan, Alaska, May 25, 1993). Steelhead fishing is especially popular on the Thorne River. The ADF&G estimated that there were 3,070 steelhead angler-hours spent on the Thorne River during the 1989-1990 season (Greenig, 1995). The popularity of the river is due to the variety of species it supports, fishing success, easy roadside access, and proximity to Thorne Bay. Fifty-five percent of the recreationists surveyed on the river were from Thorne Bay (Hoffman, 1991).

Boating (including motorized fishing boats, canoes, kayaks, and inflatable rafts) is popular on the lower sections of the Thorne River. Canoes and kayaks are used to travel on the Honker Divide Canoe Route. The 30-mile-long canoe route follows the Thorne River and Hatchery Creek. It is one of two such extensive established routes (the other is on Admiralty Island) in Southeast Alaska. Although the Admiralty route is better known, the established road system on Prince of Wales Island and Alaska Marine Highway service to the island make the Honker Divide route more accessible. An estimated 12 parties per year averaging 5 people each have canoed the entire route in recent years. Each trip averages 3 days. Canoeists/kayakers spend an estimated 360 recreation visitor days (equal to 4,320 canoeist/kayaker visitor hours) per year paddling the entire route. An undetermined number of recreationists paddle only parts of the route (Greenig, 1995).

The entire corridor has been divided into a series of RPs based on factors such as type of possible recreational activity, geographic location, and remoteness. RPs and existing and potential Recreation Sites within those places that are found within sections of river corridor located in the Project Area are described below (Figures 3-27 and 3-28).

- **Lower Thorne River (RPs 145.02, 145.03, and 145.04)**—These RPs are located along a section of the river that is wide, relatively deep, and easy to access by boat (Figure 3-42). ROS settings are RN (RP 145.02) and SPNM (RPs 145.03 and 145.04). Timber harvest has occurred in or near part of RPs 245.02 and 245.03, but not RP 145.04. RP 145.02 contains two existing Recreation Sites—a fishing area at the bridge over the Thorne River (it is also used by locals for swimming), and the Forest Service-developed Gravelly Creek picnic site near the confluence of the Thorne River with Gravelly Creek. A potential recreation shelter site has been identified near the confluence of Cutthroat Creek.

- **Thorne and Twin Lakes (RPs 145.05, 145.06, 145.07, and 145.09)**—RP 145.05 contains the Upper Thorne Portage which is approximately 2 miles long and goes around Thorne Falls. RP 145.07 contains the divide that separates the Thorne River and Hatchery Creek drainages and includes the 1-mile long Honker Divide Portage (Figure 3-27). There has been no timber harvest or road building in or near any of these RPs. Because of their pristine nature, ROS settings are Primitive (RPs 145.05, 145.07, and 145.09) and SPNM (RP 145.06). The one existing Recreation Site in this segment is a fishing site at the north end of Lower Thorne Lake. Two potential recreation shelter sites have been identified—one at the southern end of an island in Upper Thorne Lake, and another on the east shore of Lower Twin Lake.

- **Lake Galea (Honker Lake) (RPs 126.02 and 126.03)**—These two RPs include Lake Galea, the segment of Hatchery Creek downstream from Lake Galea to Butterfly Lake, and the southern half of Butterfly Lake (the half in the Project Area) (Figure 3-27). Lake Galea is in an essentially pristine area. The only access to the area is by air or river. There has been no timber harvest or road building in either RP. ROS settings are SPNM (P 126.02) and Primitive (RP 126.03). The Forest Service's Honker Lake cabin is the only existing recreation site in the two recreation places.

- **Snakey Lakes (RPs 147.01 and 147.02)**—These two RPs are located east of the main Thorne River corridor and encompass the Snakey Lakes area (Figure 3-27). Only a small portion of RP 147.01 is located in the Project Area. ROS settings are RM (RP 147.01) and SPNM (RP 147.02). There are no existing Recreation Sites in either RP, but a potential recreation shelter has been identified in RP 147.01.

See the *Wild and Scenic Rivers* section for a further discussion of the Thorne River.

Other Freshwater-based RPs

A number of freshwater-based RPs can be found in the Project Area outside of the Thorne River/Hatchery Creek Corridor (Figure 3-27). They are briefly described below.

- **Rio Roberts Creek (RPs 154.01 and 154.02)**—Both RPs include Rio Roberts Creek (Figure 3-42). RP 154.01 is adjacent to State Highway 929 and includes the Rio Roberts trailhead. RP 154.02 is located upstream from RP 154.01 and includes the Rio Roberts trail, fish pass, and fish pass overlook. ROS settings are RN (RP 154.01) and SPNM (RP 154.02).

- **Control Lake (RP 150.00)**—This RP includes Control Lake and its immediate surroundings. The hills and lands around the lake are essentially pristine, although vehicle traffic can be heard and timber harvest is somewhat visible from the lake. The RP is in an ROS setting of RN. There are two existing Recreation Sites—a Forest Service cabin and a Forest Service dock and rowboat primarily used to access the cabin. Part of the west end of the lake and the land around it has been conveyed to the State of Alaska.

- **Balls Lake (Eagle's Nest Campground) (RP 149.00)**—This RP surrounds Balls Lake and includes the Eagle's Nest Campground. Because of the presence of Eagle's Nest Campground, this RP receives more use than most of the other RPs (an estimated 295 recreation visitor days in 1992 at the campground alone). The RP has an ROS setting of RN. Two potential Recreation Sites have been identified—the trailhead and trail that would lead to Thorne Mountains. There is also a proposal to add 2.2 miles of trail to the existing 0.5-mile-long trail in order to completely encircle the lake. A day-use site on the lake near the Eagle's Nest Campground is also being developed.

- **Lower Cutthroat Lake (RP 151.02)**—This RP is located in an area surrounding Lower Cutthroat Lake, the lower slopes of Thorne Mountains, and the section of Cutthroat Creek between the lake and it's confluence with Control Creek. Timber harvesting has occurred on the slopes east of Lower Cutthroat Lake and north of the lake, and parts of some harvest units are visible from Lower Cutthroat Lake. Because of harvest activities, this RP has ROS settings of RM and SPNM. There are no existing Recreation Sites, but a potential site for a recreation shelter on the eastern shore of Lower Cutthroat Lake has been identified. A trail proposal is being considered to access this potential shelter site. The road to Cutthroat Lake is currently closed with a gate.

Land-based Recreation

Land-based recreation activities occur widely, but are most prevalent where access is more available. Recreationists use areas such as alpine ridges and mountaintops when trails are available (TLMP, 1976). The most popular land-based recreation activities are hunting, hiking (where there are trails), and driving for pleasure (where there are roads). The principal attributes of these places are good access, remoteness from communities and developed sites, availability of parking sites for recreational vehicles (but without facilities), scenery for viewing, little-used roads to explore, and freedom to choose activities (Clark et al., 1984).

Areas where land-based recreation occurs in the Project Area are somewhat limited compared to those offering opportunities for marine and freshwater recreation. However, the vastness of the undeveloped area creates the perceptions of naturalness and remoteness associated with the more defined marine and freshwater recreation places. Naturalness and remoteness are rated as very important by 80 to 90 percent of the recreation users of the Tongass (Clark and Johnson, 1981).

Land-based RPs in the Project Area generally are located in upland areas, adjacent to or on some of the prominent land forms such as Thorne Mountains. The following describes the four RPs that can accommodate primarily land-based recreational experiences.

- **Ridge East of Thorne Lake (RP 145.08)**—This RP includes much of the ridge east of Thorne Lake (Figure 3-27) and is primarily used for upland big game hunting. Access to the area is by Forest road. The RP ROS setting is RM. There are no existing or potential Recreation Sites.

- **Southern and Western Thorne Mountain (RP 151.01)**—This RP contains much of southern and western Thorne Mountain. The forested southern slopes of Thorne Mountain is visible from Balls and Control lakes and State Highway 929. The ROS settings are SPNM and RM.

- **Upper Cutthroat Lake and Northern and Eastern Thorne Mountain (RP 151.03)**—This RP includes the Upper Cutthroat Lake, its drainage, and the northern and eastern sections of Thorne Mountain. Upper Cutthroat Lake is only accessible overland or by helicopter. The area is in an ROS setting of SPNM and RM. There are no existing or potential Recreation Sites in the RP.

- **South of Control Lake (RP 153.00)**—This is a small (31-acre) RP (Figure 3-27) that was established as an observation point (to view a scenic waterfall on Steelhead Creek) or area of scenic interest. The RP has a ROS setting of RM.

Marine-based Recreation

In Southeast Alaska, the family boat is used the way wheeled recreational vehicles are used in other areas. Most marine-based recreation originates in local community boat harbors or launching sites accessed by roads. Typical day-use occurs within a 15- to 30-mile radius (University of Oregon, 1983).

The most popular marine-based activities are beachcombing and hiking, fishing, motorboating, clamming and crabbing. Other popular activities are hunting and kayaking/canoeing. Wildlife viewing is increasing in popularity. A recent survey (Shea, 1990) shows a strong relationship between marine access and wildlife viewing opportunities on the upland areas. The survey indicates that nonhunting wildlife activity, such as wildlife viewing, accessed primarily by boat is one of the fastest growing commercial recreation businesses in Southeast Alaska.

Marine-based recreation occurs mainly along the west coast of the Project Area. Saltwater fishing for salmon and halibut is common offshore of many of the RPs (Figure 3-43). Hunting takes place primarily in the upland areas above some of the RPs, and to a lesser extent along the coast. Users of the West Coast Waterway would likely use facilities in the Project Area such as cabins and shelters when they are built (they are currently identified as potential Recreation Sites).

- **Coast Northwest of Rosary Island (RP 400.00)**—Located across a channel from Rosary Island, this RP is accessible only by sea. It is in an ROS setting of SPM. The adjacent hillsides are pristine. There are no existing Recreation Sites. A potential dispersed camping site has been identified near a beach adjacent to the mouth of a stream.

- **Coast Across Channel from St. Phillips Island (RP 401.00)**—This RP extends along the Prince of Wales Island coast from about 2.5 miles south of St. Phillips Island to approximately 1.5 miles north of it. The hillsides behind the coastline in this RP and on nearby St. Phillips Island are pristine. The three existing anchorages in the RP are located in protected waters sheltered by St. Phillips Island and/or other promontories on Prince of Wales Island. The ROS setting is SPM.

- **Salt Lake Bay (RP 402.00)**—Salt Lake Bay, accessible from the water or air, offers shelter on the Gulf of Esquibel and an interesting coastline for exploration and anchorage. The ROS setting is SPM. Two existing anchorages exist in the bay. Two potential sites have been identified—a recreation shelter near the north entrance to the bay and a family picnic area in the northeast corner of the bay.

- **Nossuk Bay (RP 103.00)**—Nossuk Bay, accessible only by sea or air, offers a number of islands and inlets in which to anchor and to explore. Nossuk Bay has been assigned an ROS of RM and SPM. There are four existing anchorage sites in the bay.

Recreation Sites

Recreation Sites are existing or potential specific locations identified by the Forest Service as having exceptional recreational value. While an RP is a general location where recreational activities potentially occur, a Recreation Site is a specific location within an RP where activities are concentrated. Users of Recreation Sites also recreate in the larger RP. A Recreation Site may: (1) have developed facilities such as a campground or cabin, (2) have potential for such a

facility, (3) be an undeveloped use area, or (4) be a natural attraction conducive to specific activities such as anchoring a boat or fishing. Changes in the quality of recreational experiences at Recreation Sites based upon the seven recreation elements used to describe ROS settings can be used to compare the effects of different management alternatives on recreation.
A survey of Prince of Wales residents in 1991 asked them to prioritize potential Recreation Sites or improvements to existing sites (USDA Forest Service, No Date b). A Forest Service ID Team recommended one potential Recreation Site in the Project Area as having a high priority for development between 1992 and 1997. This projected site would involve extending the existing Eagle's Nest boardwalk around Balls Lake to make a 2.7-mile-loop trail. A day-use site is now being developed in association with the trail extension.

Twenty existing and 16 potential Recreation Sites have been identified in the Project Area (see Figure 3-28). Some of the more significant existing and potential Recreation Sites are described by category below. More extensive information can be obtained from the Forest Service or found in the Control Lake Project Recreation and Lands Resource Report (Greenig, 1994).

Recreation Cabins and Shelters

Forest Service recreation cabins and shelters are available to the public for a fee of $25 per night and are generally located near remote lakes, rivers, streams, or saltwater beaches (USDA Forest Service, 1992b). They are usually accessible only by floatplane, boat, or trail.

Cabins

- **Control Lake Cabin (in RP 150.00)**—Located on the north side of Control Lake, approximately 0.25 mile south of Forest Road 30, this cabin is accessed by a Forest Service rowboat at the west end of the lake. An unmaintained trail also connects the cabin to Forest Road 30. Cabin log entries show popular activities to be fishing, wildlife viewing, relaxing, and hunting. Guests are mainly from Prince of Wales Island or other Southeast Alaska areas. Cabin use was estimated at 794 recreation visitor days in 1992.

Control Lake Cabin

- **Lake Galea Cabin**—This cabin is located on the eastern shore of the upper portion of Lake Galea and is accessible only by canoe/kayak (for people using the Honker Divide canoe route) or floatplane. Popular activities include, fishing, wildlife viewing, relaxing, rowing the boat throughout the lake, and hunting. Guests were mainly from Southeast Alaska areas. A number of entries indicated that the cabin was a stopping point for people using the Honker Divide canoe route. Cabin use was estimated at 134 recreation visitor days in 1992.

Shelters

Seven potential sites for recreational shelters have been identified in the Project Area (Figure 3-28). Shelters are generally three-sided structures with a roof, fire pit, and bunks. Five of the shelters would be sited along the Thorne River corridor (in RPs 151.02, 145.03, 145.06, and 147.01) and would help complete a series of shelters/cabins/campgrounds for the Honker Divide canoe route. In addition, potential shelter sites have been identified for the south end of Cutthroat Lake (RP 151.02) and near the north entrance to Salt Lake Bay (RP 54411). The Salt Lake Bay shelter would be the only coastal shelter in the Project Area and would be an important addition to the West Coast Waterway.

Anchorage and Boating Sites

Anchorage sites are selected for attributes such as scenery, excellent fishing, and shelter from winds and swells. Designated sites are deep enough to accommodate most recreational boats, yet are close to shore. They can also provide safe moorage during bad weather. There are nine existing anchorages in the Project Area. Four are located in Nossuk Bay, two are in Salt Lake Bay, and the remaining three are in the vicinity of Phillips Island.

Two boat ramps near the Project Area provide saltwater access. The Big Salt Lake ramp, maintained by the State Department of Transportation, is located near the head of Big Salt Lake. The second ramp is located in the city of Klawock near the Klawock River bridge and provides access from Klawock Lake and River to Klawock Inlet.

In addition, the city docks at Craig and Klawock provide public marine access.

Campgrounds

There is currently one existing developed campground in the Project Area. The Eagle's Nest Campground is approximately 18 miles northeast of Klawock (Figure 3-28). This Forest Service campground has 11 sites and is the largest and only developed campground on Prince of Wales Island. The campground has a launch dock and boardwalk trail.

Two potential sites for dispersed campsites have been identified in the Project Area. One would be located on the north end of Butterfly Lake, slightly outside the boundary of the Project Area. It would serve the needs of canoeists and kayakers using the Honker Divide canoe route. The other potential site is located on the coast across from Rosary Creek.

Dispersed camping occurs in other places throughout the Project Area to varying degrees. Field observation shows camping along logging roads and in quarries located alongside roads. Hunters sometimes drive to the ends of logging roads to gain backcountry access and camp near the ends of the roads.

Day-use Areas

The Gravelly Creek Day-use Area is the only developed day-use area in the Project Area. It is located approximately 4 miles west of the community of Thorne Bay and is adjacent to Forest Road 30 (Figure 3-28). Activities at the day-use area include picnicking, fishing, and swimming. The area is popular with local residents and visitors.

There are also several undeveloped recreation areas that receive primarily local usage. These include the Thorne River Bridge on Forest Road 30 (located several miles east of Thorne Bay), which is used primarily by local residents for fishing and swimming; Goose Creek, which is popular with local residents and is accessed from either Forest Road 30 or Forest Road 2030; and Angel Lake, which is upstream of the lower portion of Goose Creek. A day-use area at Balls Lake near the Eagle's Nest Campground is being planned in conjunction with Balls Lake boardwalk extension and a future Thorne Mountains trail.

Trails

There are two existing developed trails in the Project Area. The longer of the two is the 0.75-mile-long Rio Roberts trail, which starts at Forest Road 30 and ends at a fish pass and viewing platform. Parking at the trailhead is inadequate and consists of a pullout area adjacent to the highway.

The second existing trail is the 0.5-mile-long boardwalk trail at the Eagle's Nest Campground. The trail starts and ends at the campground and follows part of the southern shore of Balls Lake. An extension to the trail which would create a 2.7-mile loop around the lake has been recommended.

A potential Thorne Mountain Trail would connect with the Balls Lake trail and wind its way uphill to several peaks in the Thorne Mountains.

Future Recreational Resources Near the Project Area

The Southeast Alaska Visitors Center (SEAVC) in Ketchikan was opened in 1995 under supervision of the Forest Service. SEAVC serves as a one-stop information center for visitors to Southeast Alaska. A Forest Service study examining an annex SEAVC facility in Hydaburg was completed in 1992, but no action has been taken to date. If the project is approved and an annex is built, visitation to Hydaburg and the Control Lake Project Area would undoubtedly increase.

The West Coast Waterway is located off shore along the west coast of the Project Area. Plans for the waterway include a series of recreation cabins, recreation shelters, and camping areas along the coast that would be located no more than a day's paddle (8 to 15 miles) apart. The cabins, shelters, and camping areas would be used primarily by mechanized and nonmechanized boaters using the waterway.

Existing Activities and Use Patterns

The Project Area offers opportunities for most of the outdoor recreation activities popular in Southeast Alaska. The Alaska Statewide Comprehensive Outdoor Recreation Plan (SCORP) lists the five most popular outdoor recreational activities for Southeast Alaska residents as motor boating, walking or running, fishing, driving for pleasure, and bicycling (hunting was not included on the list) (ADNR, no date). The Thorne Bay Ranger District's annual estimate of recreational use within the Thorne Bay District indicates that the five most popular activities within the District are viewing scenery, automobile travel, motor boating, saltwater fishing, and big game hunting. Participation in all of the activities occurs in the Project Area, although the extent is difficult to determine.

Although there are no figures available for the actual amount of recreational use within the Project Area, the Thorne Bay Ranger District's annual tally of District-wide use figures allows for some inferences. An estimated 194,300 recreation visitor days occurred within the District during 1992. Mechanized travel and sightseeing, the most popular activity identified, generated an estimated 101,400 recreation visitor days or 52 percent of the District's total. The following sections discuss the more popular recreational activities within the Project Area.

Mechanized Travel and Viewing Scenery

Prince of Wales Island's road system makes motor vehicle travel popular among residents and visitors. The Thorne Bay Ranger District ranked mechanized travel and viewing scenery as the most popular outdoor recreational activities in the District. Automobile travel was the most popular form of such travel, accounting for 32 percent of all RVDs. An estimated 9 percent of RVDs were devoted to sightseeing and 4 percent to power boating.

There are two main travel routes through the Project Area: (1) the Hollis-Klawock Highway, connecting Klawock with the Alaska Marine Highway ferry terminal in Hollis (which serves as the entry way to Prince of Wales Island), and (2) State Highway 9-Forest Road 30 (comprising the Big Salt Road and the Thorne Bay Road) which connects Klawock with Thorne Bay. A third road, Forest Service Road 20 (or the North Island Road), is being upgraded from Control Lake north to Coffman Cove.

Boating is also considered mechanized travel, and is a very popular activity on the island. Estimating the amount of boating activity in the Project Area is difficult. However, boats are commonly used to access the coastal parts of the Project Area for recreational activities such as fishing, hunting, gathering activities, and viewing scenery. Recreation-oriented boats can be launched or moored at several locations in the Project Area. Anchorage areas have been identified by the Forest Service in several scenic locations (Figure 3-28); the amount of use is unknown.

Fishing and Hunting

An estimated 39,000 recreation days (14 percent of the Districts' total RVDs) was devoted to hunting fish and game in 1992 (USDA Forest Service, No Date a). The distinction between subsistence and recreational fishing, hunting, and gathering is often not clear and is controversial. For this report, data that were not specifically categorized as subsistence are assumed to be recreational. Because subsistence and recreational fishing and hunting often occur in the same locations, no distinctions were made in describing locations that supported both activities.

Fishing

The island's reputation for excellent fishing is widespread. Some consider it possibly the best steelhead fishing location in North America (Batin, 1992). The Project Area also supports an impressive array of anadromous fish including pink, chum, coho, and sockeye salmon; rainbow and cutthroat trout; and one species of char (Dolly Varden). Data regarding the types and numbers of anglers using the Project Area are very limited. The Forest Service estimated that in 1992 16,500 RVDs were associated with fishing activities in the Thorne Bay District. Although the number of anglers is relatively low compared to other areas of Alaska, the number of resident anglers on Prince of Wales is increasing. Between 1984 and 1989 the estimated annual number of resident anglers increased 54 percent, from 5,750 to 8,873, suggesting that this number will continue to increase (Mills, 1990).

There is a wide variety of saltwater fishing opportunities in the Project Area. Anadromous species in the marine environment include Dolly Varden char, king, coho, pink, and chum salmon. Dolly Varden and king salmon can be caught year round but are at their peak from June through mid-July. Coho are present from June through October and peak from mid-July through September. Pink and chum salmon move into the area in June, peak in July and August, and finish running by early September. Halibut and rockfish are also popular marine species and are caught primarily from boats at offshore banks and shoals. The peak fishing season for rockfish is early spring. Halibut are most commonly caught between mid-June and mid-September. These species are present year-round and the only restriction on seasons is a closure of halibut fishing during January. Popular marine fishing locations near the Project Area include the Shinaku Inlet for halibut, the west coast along San Cristobal Channel, and areas off shore of Salt Lake Bay and Nossuk Bay (ADF&G, 1989).

Youngsters enjoying sport fishing.

The ADNR reports that certain portions of the Project Area receive intense recreation use from local communities (ADNR, 1988). Use of the area by nonresidents appears to be much less than that of residents. Because of the distances to the site and the presence of better fishing in other areas, the Project Area is not visited by charter boats nearly as much as areas closer to Ketchikan.

Freshwater fishing opportunities in the Project Area are also abundant. Prince of Wales Island is best known for saltwater king salmon and freshwater steelhead fishing. Rainbow trout, cutthroat trout, and Dolly Varden are resident in the streams and some lakes and are available year-round. Coho, pink, and chum salmon all start moving into the river systems in early summer and are available into September. King salmon do not spawn on Prince of Wales Island, but do pass by the island in impressive numbers in the summer. Steelhead availability peaks in the early spring (April and May), then again in the early winter (November and December).

Anglers use several rivers and streams in the Project Area that support freshwater species. The ADF&G considers the Thorne River to be one of 19 blue-ribbon streams in Southeast Alaska. Other popular fishing streams in the Project Area accessible by road include Rio Roberts, Rio Beaver, North Thorne River, and Control Creek. The Forest Service has issued special-use permits to guides using the Thorne River, the North Thorne River, and Logjam Creek (see below).

Hunting

As with fishing, data concerning the types and numbers of hunters in the Project Area are limited. Forest Service estimates show approximately 10,900 RVDs (6 percent of the total) devoted to hunting big game, small game, upland birds, and waterfowl in the Thorne Bay

Ranger District in 1991 (USDA Forest Service, No Date a). Big game hunting was the most popular type of hunting (an estimated 6,200 RVDs).

The Sitka black-tailed deer is perhaps the most popular big game species hunted in the Project Area. The ADNR annually estimates the number of deer harvested for subsistence and nonsubsistence use by WAA (Galginaitis, 1994). The percentage of deer harvested by nonsubsistence users in WAAs in and near the Project Area varies from 8 to 50 percent of the total harvest (Table 3-20). Table 3-20 also illustrates that subsistence harvesting and recreational hunting occur in the same area.

Galginaitis (1994) further discusses the distribution of game species and provides information concerning the harvest of big game and other species in and near the Project Area for subsistence purposes.

Hiking and Nonmechanized Water Travel

Hiking and walking in the Thorne Bay Ranger District accounts for an estimated 3,100 RVDs, or 1.6 percent of the total RVDs in the District. Canoeing and kayaking total an estimated 1,300 RVDs, with use throughout the District most likely occurring on fresh and salt water. An estimated 360 RVDs occur on the Honker Divide canoe route.

Other Activities

Many other outdoor activities take place within the Project Area, including activities such as gathering forest products (non-subsistence uses), viewing interpretive signs, environmental education, and others.

Commercial Outfitters and Special Recreational Use Permits

Some recreationists who fish in the Project Area use commercial outfitters and guides to take them to productive saltwater and freshwater fishing locations. Information concerning the intensity of commercial outfitter and guide use of saltwater areas in the Project Area is difficult to obtain. It is reasonable to assume that commercial outfitters and guides also use saltwater areas popular with recreational anglers.

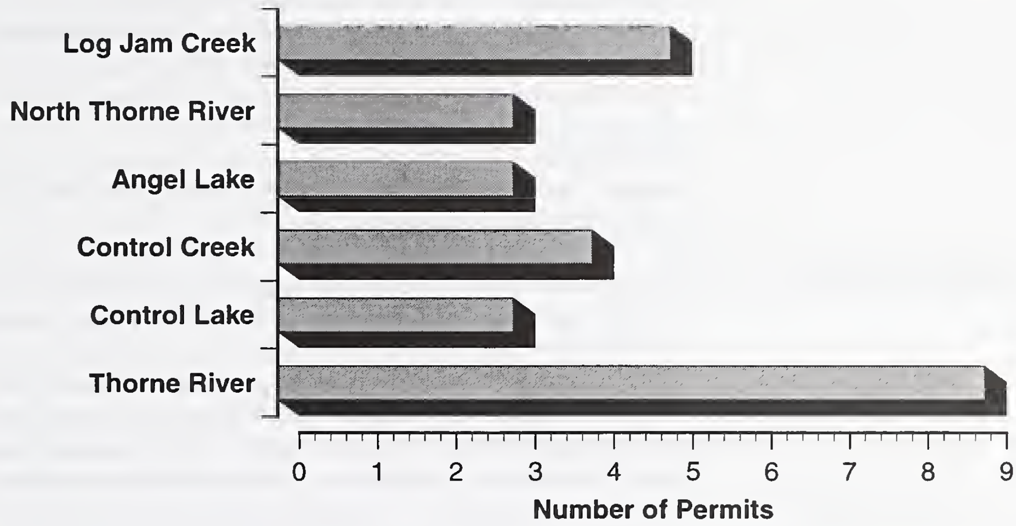
Because the Forest Service requires special use permits for commercial outfitters and guides that use rivers and streams located in National Forests, it is possible to determine which rivers and streams in the Project Area are popular with them. In 1992, the Ketchikan Area Office of the Tongass National Forest completed an Environmental Analysis of outfitter and guide use of freshwater systems on Prince of Wales. The Environmental Assessment included a list of river and creek systems on Prince of Wales Island for which permits had been requested by outfitters and guides. The freshwater systems within the Project Area for which permits were requested and the number of permits requested are shown in Figure 3-29.

The Environmental Assessment also documented outfitter and guide reports of the location of areas to which they had taken customers in 1991 and 1992, and reports the number of service days (clients) at each location. Figure 3-30 shows that the number of customers being taken to fish in the Project Area has increased.

Wild and Scenic Rivers

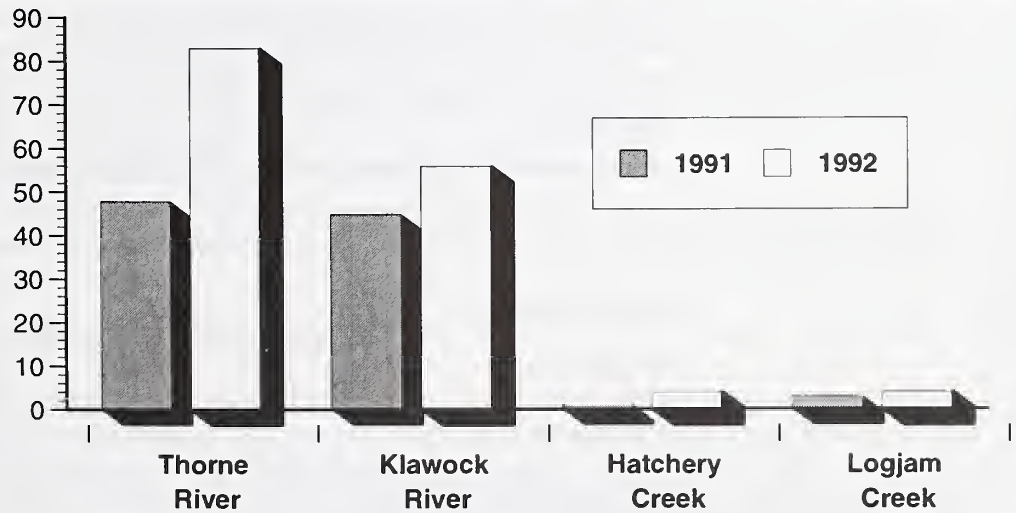
The 42-mile-long Thorne River and Hatchery Creek system has nationally significant fisheries, wildlife, recreation and scenic values. Approximately 25 miles of the system are contained within the Project Area. The river system has not been given any official designation in the National Wild and Scenic River System.

Figure 3-44
Project Area Streams and Rivers for Which Outfitter/Guide Permits Were Requested



SOURCE: Forest Service 1992b.

Figure 3-45
Number of Service Days (Clients) Used by Outfitters/Guides in and Near the Project Area in 1991 and 1992.



The lower six miles of the Thorne River (Segment 1) beginning at Thorne Bay meet the criteria for Recreation River classification and have been recommended for Recreation River designation in the TLMP (1997). The remaining 36 miles of the Thorne River-Hatchery Creek corridor (Segment 2) meet the criteria for Scenic River classification. Although 36 miles of this river system meet the criteria for Scenic River classification, the lower 12 miles (on the Barnes Lake end) of the system have been recommended in the TLMP (1997) for Recreation River designation, to allow for the development of potential recreation facilities and enhance public access to this river system.

The Recreation River section ends near the confluence of the Thorne River and Rio Beaver Creek. The remainder of the Thorne River/Hatchery Creek corridor is Scenic River recommendation within the project area.

Roadless Areas

This section identifies the roadless areas in the Project Area which meet the minimum criteria for potential inclusion in the National Wilderness System. Roadless areas identified in the TLMP (1997) inventory may be considered for wilderness recommendation or may be managed for a wide range of other resource management activities. Once an area is roaded, it is generally no longer available for wilderness consideration. Depending on when and how the activity was conducted, evidence of previous timber harvest, abandoned habitations, and historic mining may not necessarily result in an irreversible removal of land from future wilderness consideration.

To qualify as roadless, an area must contain at least 5,000 acres of undeveloped land which does not contain improved roads maintained for travel by passenger-type vehicles. However, areas of fewer than 5,000 acres may qualify if they constitute a self-contained ecosystem such as an island, are contiguous to existing wilderness, or are ecologically isolated by topography and manageable in a natural condition. Roadless areas may retain their roadless character by being managed for emphases which require relatively large, undeveloped, or natural areas, such as are usually required for old-growth habitat, scenic backdrops, or primitive recreation.

Three inventoried roadless areas identified in the TLMP (1997) are located in the Project Area. Table 3-32 shows the size of these roadless areas and the portion that lies within the Project Area. None of these was recommended for Wilderness designation in the TLMP (1997).
The National Forest policy for road building in roadless areas is currently being re-evaluated. If any changes are required as a result of this re-evaluation, they will be incorporated into this project.

Table 3-32
Inventoried Roadless Areas within the Project Area

Roadless Area	Total National Forest (acres)	Portion within Project Area (acres)	Percentage in Project Area
Kogish (509)	65,500	52,575	80
Karta (510)	52,543	20,968	40
Thorne River (511)	74,372	55,946	75

Source: USDA Forest Service, 1997.

Kogish (Roadless Area 509)

Most of the Kogish Roadless Area is found in the Project Area. Portions of the original roadless area have been extensively harvested. The more scenic areas are concentrated around the relatively rugged and diverse terrain of Kogish Mountain and Staney Cone and the intricate shorelines and island groups in Salt Lake Bay and Nossuk Bay. The only known use by local residents is occasional hunting. Subsistence use is high around Salt Lake Bay and Nossuk Bay.

Though roading and logging is evident on the perimeter, the natural integrity of the area itself is very good. Because of its difficult access, there is excellent opportunity for solitude, except for logging sights and sounds near the boundaries. Most recreation attractions are associated with the saltwater bays, anchorages, and channels on the west side where the ROS setting is primarily SPM.

The 1989-1994 Operating Period EIS for the KPC Long-term Contract approved the harvest of 2,026 acres near Kogish Mountain, Staney Cone, upper Staney Creek, and the Shaheen Creek. Such harvest has affected the character of about 10 percent of the roadless area. The geology of the area indicates some potential for discovery of valuable minerals. The rugged terrain and difficult access provide opportunities for dispersed recreation and the western and southern boundaries have potential for shelter sites and boat anchorages for small boats and kayaks.

Karta (Roadless Area 510)

The Karta Roadless Area is located on the south edge of the Project Area. Salmon Lake, Karta Lake, and the Karta River form the principle water systems within this roadless area. The area is accessible by water at Kasaan Bay and by road on the north, west, and south sides and receives substantial recreation and subsistence use. Known prehistoric village sites, rock art, and other evidence of cultural history can be found in the area. There are five recreation use cabins and 8 miles of trail within the roadless area.

The natural integrity of the area is very good. The Karta River drainage is so popular during the summer months that there is limited opportunity for solitude. Heavy cabin use, floatplane traffic, and trail use make encountering other parties during the summer highly probable. The alpine ridges that rim the Karta River drainage provide more opportunity for solitude. Extensive timber harvest along the periphery of this roadless area causes the edges to fall within the RM or SPM ROS classes.

The 1990 Tongass Timber Reform Act designated 39,894 acres of the Karta River area as Wilderness. A portion of this roadless area is also within the Maybeso Experimental Forest.

Thorne River (Roadless Area 511)

This roadless area includes a large part of central Prince of Wales Island and almost all of the Thorne River drainage. Access to the interior is by floatplane, canoe, or kayak and is advised for skilled boaters only. Notable features include the area around Snakey Lakes, an intricate complex of narrow, winding freshwater bodies north of the main Thorne River drainage, and the many areas of grassy meadows and large stands of spruce in portions of the Thorne River. The

Honker canoe route within the area is used primarily by local recreationists using portions of the route. This roadless area has outstanding fish habitat, and subsistence and recreation use of the area is significant. Very good opportunities for solitude exist within the area, excluding the fringe where the sights and sounds of logging and traffic may be evident. The interior offers outstanding opportunities for primitive recreation, particularly canoeing and fishing. Under the TLMP Revision (1997), the Thorne River, Honker Divide, and Snakey Lakes area are to be managed mostly as Old Growth Habitat.

Wilderness

The Karta Wilderness is located immediately south of the Project Area. This 39,894-acre area includes the drainage of the Karta River system at the head of Kasaan Bay, about 5 miles from the communities of Kasaan and Hollis. The Karta River area contains high value fish habitat for coho salmon. The two major lakes, Salmon Lake and Karta Lake, are important spawning sites for sockeye salmon. One mine previously produced gold, and there are other known mineral deposits. Recreation use is high; the four Forest Service recreation cabins are in such demand that reservations are managed using a lottery system. Subsistence use is also very high.

Chapter 4

Environmental Consequences

Chapter 4

Environmental Consequences

Introduction

This chapter provides the scientific and analytic basis for the comparison of alternatives presented in Chapter 2. It presents the expected effects on the physical, biological, social, and economic environments associated with implementation of the alternatives. All significant or potentially significant environmental consequences to each resource area are disclosed, including the direct, indirect, and cumulative effects. These effects may have consequences that are both beneficial and detrimental. The means by which potential adverse effects might be reduced or mitigated also are described for each alternative. Effects are quantified where possible, although qualitative discussions are often necessary. Finally, each section discusses monitoring recommendations for each resource area.

Analyzing Effects

Chapter 4 begins by discussing the environmental consequences of the alternatives by the same categories used in the description of the affected environment in Chapter 3 (i.e., timber, wildlife, economic, and social, etc.). Within each category, the direct, indirect, and cumulative effects are disclosed. Direct environmental effects are defined as those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity but would be considered significant in the foreseeable future. Cumulative effects result from the incremental effects of actions when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. The reasonably foreseeable time frame over which both direct and indirect effects are estimated is here interpreted to mean through the year 2007. Cumulative effects are also projected for various resources up to the year 2057. The year 2057 is the year by which most areas within LUDs permitting timber harvest could be converted from old-growth to second-growth timber management. Other cumulative effects will use 2095 by incorporating, by reference, 1997 TLMP Final EIS analyses.

The cumulative effects analysis in this document tiers to the current Tongass Land and Resource Management Plan (TLMP 1997). It also considers the 10-year timber sale action plan referenced in Appendix A which is used to project the volume range to be harvested in future operating periods. As a result, the cumulative effects do not depend entirely on the alternatives presented in this EIS. Rather, they include what may be expected under the direction detailed in the TLMP. The decisions made in the TLMP provide long-range direction for management of the Tongass National Forest for the duration of the Forest Plan. Cumulative effects analyzed in this EIS include both the effects of this project and those projected by the 1997 TLMP Revision.

The following assumptions were made to assess the reasonably foreseeable effects to the year 2007. These assumptions reflect current management and technology of National Forests and provide a uniform approach to estimating effects of timber harvest and road construction.

- Laws, guidelines, and BMPs for resource protection would be followed. These requirements are expected to be at least as stringent in the future as they are today.

- Timber sale planning would occur in an interdisciplinary fashion.

- All acres of suitable commercial forest land are equally subject to impacts.

- The no action alternatives would represent only a delay in implementing the TLMP and, based on volume projections, foreseeable cumulative effects would begin to occur before 2007.

- Future effects on resources from ongoing timber harvest and road construction will be similar to impacts projected for current alternatives.

Chapter 4 concludes with other environmental considerations that must be addressed under NEPA but do not fall under the categories discussed in Chapter 3. These topics include unavoidable adverse environmental effects, the relationship between short-term uses and the maintenance and enhancement of long-term productivity, the irreversible and irretrievable commitments of resources, possible conflicts between the proposed action and the plans of other jurisdictions, and other environmental considerations.

- *Short-term effects* are those that occur annually or within the first 10 years of project implementation.

- *Long-term productivity* refers to the capability of the land and resources to continue producing goods and services for 50 years and beyond.

- *Irreversible commitments* are decisions affecting nonrenewable resources such as soils, minerals, plant and animal species, and cultural resources. Such commitments are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or the resource has been destroyed or removed. The gradual decline in old-growth habitat or significant loss of soil productivity would be considered irreversible commitments. LUDs allowing land-altering activities were established by the Forest Plan, but the actual commitment to develop, use, or affect nonrenewable resources in the Control Lake Project Area was made in the development of this project.

- *Irretrievable commitments* represent opportunities foregone for the period during which resource use or production cannot be realized. These decisions are reversible, but the production opportunities foregone are irretrievable. An example of such commitments is the allocation of LUDs that do not allow timber harvest in areas containing suitable and accessible timber lands, a decision that is made at the Forest Plan level. For the time over which such allocations are made, the opportunity to produce timber from those areas is foregone, thus irretrievable.

Climate and Air Quality

Key Terms

Ambient air—that air, external to buildings, encompassing or surrounding a specific region.

All of the management alternatives are expected to have limited, short-term impacts on the ambient air quality. Alternative 1, the No Action Alternative, would result in the least emission of particulate and gaseous air pollutants in the near term. The potential for uncontrolled forest fires eventually might be increased under these alternatives, and the levels of air pollution that would result are likely to be comparable to those associated with other alternatives.

Local sources of airborne particulates produced or increased by the action alternatives include motor vehicle emissions, dust from road construction and motor vehicle traffic, residential and commercial heating sources, marine traffic, and emissions from burning at sawmills. No prescribed burning is proposed in any alternative so there will be no effect on air quality from this source. Fugitive dust generated from road construction and increased vehicular traffic may temporarily affect air quality.

The action alternatives would result in a continued supply of raw wood products to timber operators. It is the timber operator's responsibility to ensure that emissions from their mills are within legal limits. Wood debris is also burned at the Thorne Bay sort yard on Prince of Wales Island. Purchasers using this facility are also responsible for ensuring that emissions are within legal limits.

The direct and cumulative effects of the proposed action alternatives upon air quality will be a continuation of the existing local ambient air quality, which will be improved in the Ketchikan Area due to the closure of the KPC pulp mill.

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Geology, Minerals, and Karst

Key Terms

Carbonate rocks—rocks such as limestone and dolomite which contain a high content of calcium carbonate, $CaCO_3$.
Cave resources—any material or substance occurring in caves on Federal lands, such as animal life, plant life, paleontological resources, cultural resources, sediments, minerals, speleogens, and speleothems.
Cave—any naturally occurring void, cavity, recess, or system of interconnected passages which occurs beneath the surface of the earth or within a cliff or ledge and which is large enough to permit an individual to enter.
Karst—a type of topography that develops in areas underlain by soluble rocks, primarily limestones.
Sinkhole— relatively shallow, bowl- or funnel-shaped depressions ranging in diameter from a few to more than 3,000 feet.

Introduction

Environmental consequences for timber harvests affecting the geological setting in the Control Lake Project Area must consider the presence of minerals and karst landscape. Timber harvests will have no impact on mineral resources, primarily because no deposits of commercial value have been identified within the Control Lake Project Area. No claims are filed in the Project Area and only one site has been investigated recently north of Black Bear Lake.

Karst landscape has been identified on approximately 18,000 acres of the total 201,000 acres within the Project Area, and represents less than 9 percent of the total area. Three harvest units in the action alternatives are underlain by limestone with some epikarst development. These 3 harvest units contain a total of about 99 acres from an initial harvest unit pool of 9,409 acres, or 1 percent of the proposed unit pool. These limited acreages of land and the localized nature of the outcrops tend to minimize the effects of harvest on karst resources.

Direct, Indirect, and Cumulative Effects on Mineral Resources

Timber harvest will not have a direct impact on the area's mineral resources. Since all shows of mineralization were located on harvested lands, the indirect effects of new harvests will improve the opportunity for mapping and prospecting for new deposits. Ease of access derived from logging road construction is a significant factor in the discovery of new prospects.

Cumulative effects of timber harvest will expose larger areas to evaluation for mineral development. As areas of mineral soil are exposed, the potential exists that more thorough evaluations will be possible.

Mitigation for Mineral Resources

One prospect, the Black Bear Lake site, was explored during 1993. It is located approximately two miles from a proposed harvest unit and within the same canyon. No evidence of claims, current or abandoned, was found during the field work. In the event that claim monuments or boundaries are encountered during harvest they should be protected and mapped for future reference.

Mining law gives citizens statutory right to enter public lands for mineral prospecting. Access cannot be prevented by road access management controls. However, entry can require permits to utilize restricted roads. In the event that unidentified claims or disputed areas are found they should be left undisturbed. No additional mitigation for mineral resources is recommended.

4 Environmental Consequences

Monitoring for Mineral Resources

No project-specific monitoring of mineral shows, prospects or claims is recommended. Future prospecting will be regulated by existing laws, and the registration of claims will provide documentation for future reference.

Direct, Indirect, and Cumulative Effects on Karst Resources

The purpose of the Federal Cave Resources Protection Act (FCRPA) of 1988 is to secure, protect, and preserve significant caves on Federal lands for the perpetual use, enjoyment and benefit of all people. Caves determined to be significant under the act are to be considered for listing on the National Significant Cave List. Cave management guidelines are contained in the 1997 TLMP Revision Standards and Guidelines (USDA Forest Service, 1997).

As part of the Ketchikan Area Karst Study, karstlands within the Control Lake Project Area were rated for their vulnerability to surface disturbance. Of 6,884 acres underlain by carbonate rock, 2,559 acres were rated as low vulnerability, 1,919 acres were rated as moderate vulnerability, and 2,406 acres were rated as high vulnerability. The high vulnerability ranking is reserved for karst land that contains well-developed epikarst, significant caves, extreme density of karst features, or diversity of solution features on lands that contribute in an important manner to fisheries, wildlife habitat or water resources. An additional 11,263 acres of non-carbonate land are ranked as high vulnerability. This land is in watersheds which contribute surface runoff to high vulnerability karst areas. The inclusion of contributing watersheds in the high vulnerability rating is due to the potential for adverse effects from surface flow into karst systems. The vulnerability rating of contributing watersheds can be modified (downgraded) where on-site investigation demonstrates that surface flow from the watershed does not connect to any insurgence in the karst areas downstream. No harvest units or roads are proposed on high vulnerability karst.

Some of the karst terrain in the Project Area has been previously harvested. The effects of past logging on karst terrain include loss of sediment and clogging of solution systems by redirection of drainages and disposal of slash debris. Indirect effects on karst as a result of logging can include redirection of runoff, changes in pH of surface waters, and possible changes to the micro climate around cave entrances. These indirect effects can change solution and deposition characteristics within the underground environment. Harvested karst terrain east of Cutthroat Lake, where no buffers around karst terrain and no drainage control have been implemented, display debris-choked grike systems. While disruption of the sinkhole and grike systems is apparent, previous timber harvest or road construction has not affected any known cave resources in the Control Lake Project Area. Future protection measures will be necessary in order to prevent damage for harvest units with significant karst resources. Avoidance of caves and karst terrain and/or prescribing site-specific mitigation measures will help minimize long-term cumulative effects on the cave resources.

On-site field studies identified a narrow belt of karst extending southward parallel with the central boundary of the Project Area, curving southwestward south of Cutthroat Lake, and pinching out above Control Lake. Prior timber harvest has exposed extensive karst resources southeast of Cutthroat Lake. Deeply incised ridges with grikes and small sinkholes are found in cleared areas. The limestone layers in this vicinity are less than 1,000 feet long and about 200 to 300 feet thick. Two separate layers were found, both dipping about 45 degrees to the west-northwest into the ridge. The two layers are discontinuous at the surface and may also be discontinuous at depth. The several caves identified in the Control Lake Project Area have depths of less than 100 feet, and some caves are dry with evidence of past stream action. Numerous resurgences are present. Most observed insurgences are small and not readily accessible to humans.

Six original harvest units were identified as containing karst. Three of these units were dropped from the project unit pool due to the presence of very well developed karst or significant karst features. The remaining three units were partially or fully underlain by limestone.

The harvest units that are currently underlain by limestone contain only minor karst features. The karst in these units was rated as low or moderate vulnerability. Deep soils, low relief, gentle slopes and a limited extent of karst development within and adjacent to these harvest units implies a low to moderate risk of damage to the karst resources from the effects of harvest.

Alternatives 11, 12, and 13 would include a small harvest area (about 10 acres) on karst land. The harvest areas are to be helicopter logged and no road construction is needed to access the harvest areas. This represents 0.5 percent or less of the total harvest area in any single alternative. Alternative 10 would not intersect any karst lands.

Because of the limited extent of the limestone pods and the relative scarcity of karst in the Project Area, the long-term cumulative effects to cave resources are expected to be minimal. This assumption is based on observations of groundwater resurgences at the basal contact of the limestone units. Groundwaters apparently resurge relatively close to their insurgence, which indicates a potentially limited extent of limestone. Minimal long-term cumulative effects are dependent on the avoidance of upslope areas, effective use of buffers, and continued stabilization of erosion and runoff. Most of the karst, especially the higher vulnerability karst, are now in non-development LUDs.

Mitigation for Karst Resources

Potential effects to karst and cave resources have been minimized or eliminated due to mitigation measures. Three logging units with prominent karst were deleted during field studies. Three additional units contained pods of limestone with accompanying caves or resurgences. These units have been modified so that significant karst features are excluded from the unit boundaries. In addition, the harvest units have no-cut buffers to protect remaining (minor) karst features that were observed in the field and to protect their contributing upper watershed area.

The 1997 TLMP Revision Standards and Guidelines provide guidance for protection of karst resources. Mitigation of potential damage to karst resources include no-cut buffer zones around cave entrances, insurgences and resurgences, and limitation of logging within watersheds upslope of significant karst areas. Buffers of sufficient width to provide windthrow protection and a capture area for sedimentation have been defined. No-cut buffers take into consideration the soil properties within the buffer zone, drainage characteristics, slope gradient and windfirm characteristics of the trees within the proposed zone. All access roads located above the mapped limestone outcrops require drainage control to direct runoff from roadside ditches away from the limestone outcrops. The size of the limestone outcrops are small. Buffers, drainage control and special treatment requirements are not expected to require a significant effort.

Additional karst resource mitigation can be provided during final harvest unit layout. The Ketchikan Area karst resource specialist shall review final unit layout during final review of all units located on vulnerable karstlands to ensure that appropriate mitigation measures are implemented.

Cave resources offer recreational opportunities in the Project Area. Cave Management direction are provided in the 1997 TLMP Revision to help protect fragile areas and provide safe recreational opportunities. Following further exploration and inventory, some systems will be open to controlled public access, and some likely will be closed to protect fragile cave resources.

Monitoring for Karst Resources

The Forest Plan recognizes three distinct types of monitoring: implementation, effectiveness, and validation. Implementation monitoring determines if projects and activities comply with Forest Plan standards and guidelines. Effectiveness monitoring determines whether the standards and guidelines achieve the desired result. Validation monitoring determines whether the assumptions in the Forest Plan regarding the relationship between management actions and their effects are correct, or if there is a better way to depict these relationships.

The Forest Plan specifically contains monitoring items for the implementation and effectiveness of the standards and guidelines for protecting karst and cave resources. The Control Lake Project Area will contribute towards meeting overall Forest Plan and Ketchikan Area Monitoring Strategy goals through the selection of proposed harvest units/roads for monitoring.

Soils

Key Terms

Glacial till—gravel, boulders, sand, and finer materials transported and deposited by a glacier.
Mass movement index (MMI)—rating used to group soil map units that have similar properties with respect to the stability of natural slopes.
Mass movement—general term for a variety of processes by which masses of earth material are moved downslope by gravity either slowly or quickly.
McGilvery soil—shallow, forested, organic soil developed over bedrock.
Sediment—solid materials, in suspension or transported by water, gravity, ice, or air.
Soil productivity—capacity of a soil to produce plant growth, due to the soil's inherent chemical, physical, and biological properties.
V-notch—a shallow to deeply cut stream drainage, generally in steep, mountainous terrain; would look like a "V" from a frontal view.

Introduction

Soil disturbance is an unavoidable consequence of timber harvest and road construction. Even though mitigation steps are taken to reduce disturbance, it is not possible to eliminate it completely. The level of disturbance varies with management practices and site characteristics. Areas most susceptible to disturbance from management activities were identified during both office preview and field verification of units and were eliminated from the harvest units. The areas that were eliminated included those of very high mass movement hazard and areas with greater than 41 percent very shallow organic soils (i.e., McGilvery series).

Soil impacts can be reduced below threshold levels by adhering to Soil Management Handbook standards and guidelines FSH 2509.18, BMPs of the Soil and Water Conservation Handbook FSH 2509.22, and the application of erosion control provisions of the timber sale contract. The standards and guidelines, BMPs, and contractual provisions include specific logging requirements such as one-end or full-log suspension, split yarding, and controlled felling. The 1997 TLMP Revision includes standards and guidelines for timber harvest on slopes greater than 72 percent, and for construction of roads on side slopes of 67 percent or greater. These are being incorporated into the project design.

Direct and Indirect Effects

The following section discusses the effects of timber harvest on soil productivity and soil erosion. Soil productivity is evaluated by the amount of soil disturbance associated with timber harvest and road building. Soil erosion is evaluated by considering the acres of soil exposed in timber harvest units and the potential for landsliding or mass movement from timber harvest and road building.

Soil Productivity

Soil Disturbance (Displacement)

Timber harvest may result in soil displacement, exposure, or puddling, which can reduce soil productivity. Soil displacement is the main soil disturbance in southeast Alaska (FSH-R10-Supplement 2500-92-1). It is defined as the horizontal movement of soil from one place to another by mechanical forces, such as those associated with logging equipment. Observations in the Ketchikan Area indicate that the degree of disturbance is related to the type of yarding that occurs at a harvest unit. Table 4-1 shows potential acres of soil disturbance based on acres harvested and logging system. The values shown are based on preliminary observations, but they provide an index to allow comparison of alternatives. These values are all below the 15 percent soil disturbance threshold (detrimental displacement) established in FSH 2500. Ground-based logging systems that achieve partial to full suspension are assumed to produce 6 percent soil disturbance and other ground-based logging systems are assumed to produce 12 percent soil disturbance, based on observations of harvest units in the Ketchikan Area (USDA Forest Service, 1993). Soil disturbance associated with helicopter yarding ranges from 1 to 5 percent (USDA Forest Service, 1993; Clayton, 1981); a median value of 3 percent was used. Soil disturbance ranges from 69 to 238 acres or approximately 6 to 7 percent of the acres harvested. Any impairments to soil productivity would be reduced as the site is revegetated. Consequently, effects beyond 5 to 10 years would be small.

Table 4-1

Estimated Soil Disturbance by Watershed due to Harvesting (in Acres)

Name	Watershed	Alt. 10	Alt. 11	Alt. 12	Alt. 13
Unnamed	000Z	0	0	0	0
Unnamed	BT2A	0	0	0	0
Unnamed	BT9A	0	0	0	0
103-70-03	BW1A	0	0	0	0
103-80-56	BW2A	0	0	0	0
Unnamed	BW3A	0	0	0	0
Hatchery Creek	C20D	0	0	0	0
Logjam Creek	C21C	0	16	19	16
Unnamed	C49B.0001	0	3	3	3
Goose Creek	C49B.10,.11,.12	18	31	31	31
Control Creek	C49B.20,.24,.25,.26	0	5	8	3
Rio Beaver	C49B.21	22	23	26	23
Rio Roberts	C49B.22	0	9	9	0
Upper Thorne R.	C49B.23	0	12	37	12
North Thorne R.	C49B.27	0	5	5	5
Steelhead Creek	C95B	20	32	34	33
Election Creek	C96A	0	5	5	5
Shinaku Creek	D03B	8	26	26	26
103-60-05	D08A	0	16	33	0
11 Mile Creek	D09A.0100	0	0	0	0
Goodrow Creek	D10A	0	0	0	0
Unnamed	D12A.0001	0	1	1	1
Nossuk Creek	D12A.01	0	1	1	0
103-80-46	D14A	0	0	0	0
103-80-50	D15A	0	0	0	0
James Creek	D16A	0	0	0	0
TOTAL		69	186	238	160

Road Construction Acreage

The construction of roads, landings, and excavation of quarries removes soil from the forest land base. Assuming a 75-foot disturbed road corridor, each mile of road would cut, fill, or otherwise disturb approximately 9 acres of land. In addition, approximately, 1.5 acres of soil are disturbed for the average quarry, which supplies rock for approximately 2 miles of road. Additionally, one or more landings per unit would require about 0.2 to 2 acres depending on the logging system and the number of settings. As a worst-case analysis, all of this land is considered to be permanently taken out of production. Table 4-2 shows the acres of road-associated disturbance, including quarries and landings, for the action alternatives. Alternative 12 has the highest acreage of road-associated disturbance followed by Alternatives 11, 13, and 10, in that order.

Table 4-2

Estimated Soil Disturbance by Watershed due to Road Construction (in acres—includes quarries and landings)1/

Name	Watershed	Alt. 10	Alt. 11	Alt. 12	Alt. 13
Unnamed	000Z	0	0	0	0
Unnamed	BT2A	0	2	2	2
Unnamed	BT9A	0	0	0	0
103-70-03	BW1A	0	0	0	0
103-80-56	BW2A	0	0	0	0
Hatchery Creek	C20D	0	0	0	0
Logjam Creek	C21C	0	44	82	44
N. Thorne River	C45D, C49B.2700	0	19	19	19
Unnamed	C49B.0001	0	6	6	6
Goose Creek	C49B.10,.11,.12	29	88	88	87
Control Creek	C49B.20,.24,.25,.2	2	13	30	0
Rio Beaver	C49B.2100	72	75	93	50
Rio Roberts	C49B.2200	15	32	33	12
Upper Thorne River	C49B.2300	0	19	84	18
Paul Young Creek	C72A	2	2	2	2
Black Bear Creek	C93A	0	0	0	0
Steelhead Creek	C95B	47	107	116	116
Election Creek	C96A	0	12	12	12
Staney Creek	C97C, C99C	8	11	11	11
Shinaku Creek	D03B	26	56	56	56
103-60-05	D08A	0	85	136	0
11 Mile Creek	D09A	0	0	0	0
Goodrow Creek	D10A	0	0	0	0
Unnamed	D12A.0001	0	2	2	2
Nossuk Creek	D12A.01	0	8	8	0
103-80-44	D13A	0	0	0	0
103-80-46	D14A	0	0	0	0
103-80-50	D15A	0	0	0	0
James Creek	D16A	0	0	0	0
TOTAL ACRES		201	582	782	437

1/ Based on the assumption that 9 acres are disturbed per mile of road for the road corridor and an additional 1 acre is disturbed per mile of road for quarries and landings (10 acres per mile total).

Soil Erosion

Surface Erosion

Soil disturbance during timber harvest can reduce the ability of the organic mat and the mineral soil to absorb water, thereby making increased surface erosion possible. Soil disturbance and associated soil erosion can contribute to reduced soil productivity. This effect will occur for a short period of time until the site is revegetated, typically 3 to 5 years.

As shown in the *Soil Disturbance* subsection, Alternative 12 has the most acres disturbed while Alternative 10 has the least. In general, surface soil erosion that occurs within timber harvest units has a limited possibility for contributing sediment to streams. The main BMPs to minimize soil disturbance near Class III streams are buffers, controlled felling of trees away from streams, and yarding these trees away from streams (split yarding). In addition, Class IV streams are often used as logical setting breaks which further reduce potential soil disturbances and potential erosion. Site-specific recommendations for controlled felling and split yarding are contained in the unit cards. The potential for sediment delivery from all harvest units to streams is considered in more detail in the *Water, Fish, and Fisheries* section.

Landslides

Landslides are most likely to occur when timber harvest and road construction occurs on high and very high MMI soils. The prefield and field verification processes eliminated areas on very high MMI soils from the harvest units. In addition, during field verification logging road access to several areas indicated an unacceptable landslide risk to both the soil resource and the road. Timber harvest units beyond the roaded sites were prescribed for helicopter logging. The acres of management activity on high MMI soils quantifies the areas most sensitive to mass movement. Table 4-3 shows the acreage of high MMI soils within harvest units by watershed.

Table 4-3
Acreage of Harvest Units on High MMI Soils

Name	Watershed	Alt. 10	Alt. 11	Alt. 12	Alt. 13
Unnamed	000Z	0	0	0	0
Unnamed	BT2A	0	0	0	0
Unnamed	BT9A	0	0	0	0
103-70-03	BW1A	0	0	0	0
103-80-56	BW2A	0	0	0	0
Hatchery Creek	C20D	0	0	0	0
Logjam Creek	C21C	0	68	81	68
Unnamed	C49B.0001	0	4	4	4
Goose Creek	C49B.10,.11,.12	51	88	88	88
Control Creek	C49B.20,.24,.25,.2	0	24	31	1
Rio Beaver	C49B.2100	181	181	185	181
Rio Roberts	C49B.2200	1	42	42	1
Upper Thorne R.	C49B.2300	0	149	317	149
N. Thorne R.	C49B.2700	0	34	34	34
Steelhead Creek	C95B	113	140	173	156
Election Creek	C96A	0	30	30	30
Shinaku Creek	D03B	122	375	375	375
103-60-05	D08A	0	13	14	0
11 Mile Creek	D09A.0100	0	0	0	0
Goodrow Creek	D10A	0	0	0	0
Unnamed	D12A.0001	0	5	5	5
Nossuk Creek	D12A.01	0	15	15	8
103-80-44	D14A	0	0	0	0
103-80-46	D15A	0	0	0	0
103-80-50	D16A	0	0	0	0
TOTAL		468	1,168	1,394	1,100

As discussed earlier, steep slope and stream areas that were mapped or classified as very high MMI have been eliminated from potential harvest units. Potential harvest units that still have steep slopes (>72 percent) are being evaluated on a case-by-case basis for potential soil mass wasting and stream channel stability. Many of the potential harvest units have received more intensive reconnaissance since the 1993 field season. Based on this more intensive ground investigation, some of the steeper areas have been eliminated from the affected units. In some cases whole units have been dropped (i.e., 577-410, 595-424). These more intensive investigations are ongoing. Four units (575-420, 594-401, 594-409, and 597.2-414) contain more than one acre of area with 75 percent or greater slope according to GIS mapping. Seven additional units (575-409, 575-411, 575-425, 594-411, 594-412, 594-413, and 594-419) contain less than one acre. These units will be closely evaluated during final layout. Similarly, roads located on steeper slopes (>67 percent) or in slide-prone areas are being evaluated. Final road locations will avoid these areas where feasible and incorporate special design criteria to prevent soil erosion and mass wasting where they cannot be avoided.

Mass wasting is a naturally occurring phenomenon in the Project Area (Swanston, 1969). However, it is well known that timber harvest and associated road construction increase mass wasting frequency over natural background levels (Sidle et al., 1985). Mass wasting occurs when the gravitational force overcomes the cohesive strength of the soil. This may occur when local increases in the water table create increased pore water pressures that decrease the friction between soil particles to the point that they move downslope under the influence of gravity. This increase in pore water pressure is most common at the soil-till contact in soils developed on compact till. Timber harvest accelerates this process in two ways. First, transpiration is initially decreased with tree removal. This increases soil moisture and allows a higher rise in the water table for a given rainstorm, which is more likely to destabilize the slope (Wu and Swanston, 1980). Second, tree removal ultimately results in the decay of tree roots. Tree roots add cohesion to the soil, which counteracts the increased pore pressure caused by rises in the water table. As the roots decay the added cohesion is lost and consequent increases in mass-wasting frequency begin about 3 to 7 years after harvest (Bishop and Stevens, 1964; Sidle et al., 1985; Swanston and Marion, 1991).

Swanston and Marion (1991) evaluated mass-movement frequency under natural and harvest conditions throughout Southeast Alaska over a 20-year period (1963 to 1983). The observed landslide rate in timber harvest areas was 0.021 landslides per 1,000 acres per year. Harvesting increased the landsliding rate by 3.5 times over natural conditions. The rate is based on a very large area (202,000 acres), however, and differences in topography, geology, and local site conditions make this rate unreliable as a predictor of landslide activity at a specific site.

Swanston and Marion (1991) also found that only a small percentage of the coarse sediment transported by these landslides reached streams. The landslide survey categorized 23 percent of all landslides as debris torrents that occur in deeply cut V-notch gullies. Long-term impacts (greater than 10 years) to channel form and function and to fish habitat would be anticipated for Class I channel segments directly affected by a large landslide (Hogan and Wilford, 1989). Based on these results, there is about a one-in-four chance that any management-related landslide will have an impact on Class I streams and only a small chance that impacts on fish habitat could occur. It can be inferred that the majority of these landslides would affect primarily Class III and IV stream channels, since only about three percent of all natural and management-induced slide events in this survey were shown to directly affect Class I streams. However, the slides reaching Class II, III, and IV streams may indirectly affect Class I streams, as finer fractions of sediment from debris can easily be transported downstream.

Cumulative Effects

An estimate of the cumulative soil effects for the Project Area can be obtained by assuming that the level of harvesting would remain relatively constant over the average rotation period of 100 years. Cumulative effects of these actions on long-term soil productivity are directly related to the amount of soil disturbance that occurs through time and the amount of recovery that takes place in the soil system in that time. Soil disturbance, erosion, and the associated loss of productivity resulting from timber harvest activities will occur. Most of these effects will be relatively short-term; they will last until revegetation occurs subsequent to each entry. Revegetation sufficient to provide ground cover in most areas will occur within 3 to 5 years of timber harvest.

The effects on the soil resource by mass movement can be evaluated by examining the projected total timber harvest and the harvest on high MMI soils that would occur between 1994 and 2054. Under Alternative 12, approximately 1,394 acres of high MMI soils and 3,769 total acres would be harvested. After implementation of Alternative 12, there would be less than 19,000 total acres of old-growth remaining in the suitable timber base to be harvested through the end of the rotation period, or about 10 percent of the Project Area. The impacts associated with this additional harvest would be dispersed through time, averaging less than 400 total acres per year (see *Silviculture, Timber and Vegetation* section). Mass movement hazard peaks about 3 to 7 years after timber harvest as root decay decreases soil cohesion. As revegetation occurs and roots systems develop, soil cohesion increases and the mass movement hazard in harvested areas decreases. Mass movement hazards from roads may persist longer depending on local conditions and road maintenance and abandonment procedures. Consequently, after about 20 years from any individual entry, the effects diminish significantly. Individual watersheds could experience locally significant effects from landslides, but when considered over the entire Project Area, the cumulative effects should be within acceptable levels during the period from 1997 to 2054.

Cumulative effects from road and associated landings and quarries can be estimated by adding existing and proposed acreages of each. Approximately 78 miles of new roads would be constructed in Alternative 12. These roads would increase the percent of roaded area in some watersheds significantly. Watersheds with a high percentage of their area in roads would be susceptible to sedimentation impacts if BMPs are not properly implemented.

Loss of soil productivity is the other major effect of roading. To minimize adverse soil productivity effects, management activities during this interval will utilize existing BMPs and any new soil conservation practices as they are developed and implemented. By maintaining soil productivity during this period, the cumulative effects of these actions will remain within soil productivity thresholds.

Mitigation

Mitigation for protecting the soil resource occurs through both planning and implementation. Mitigating the effects of timber harvest on soils includes avoidance (for example, excluding road construction and timber harvest on unstable soils). Avoidance begins as planning-level mitigation through the soil survey of the area, which provides a field reconnaissance of the soil resource and sensitive soil areas. For the Control Lake Project, this information, combined with vegetation mapping and aerial photograph interpretation, provided an initial level of screening for timber harvest unit and road placement which allowed avoidance of very high mass movement soils and wetlands. Field verification of the units and roads resulted in site-specific identification of very high mass movement soils and areas dominated by McGilvery soil. These observations resulted in the exclusion of such areas from harvest units and, in some cases, elimination of entire harvest units (Mitigation Measure F1). Specific harvest units affected by these and other mitigation measure are identified in Appendix C.

Another means of reducing landslide potential and to maintain long-term productivity is to require partial or full suspension on harvest unit areas that have high mass movement potential or McGilvery soils (Mitigation Measure F3). Harvest units with partial or full suspension requirements are identified in Appendix C and on the unit cards in Appendix D.

Additional soil mitigation can also be provided during final harvest unit layout. A soils specialist will check off mitigation measures on the final unit and road cards. The sale administrator will be responsible for ensuring the implementation of contract items. If further field examination of the harvest units identifies areas with questionable stability or a high percentage of McGilvery soils, then additional site investigation by a soil resource specialist will occur and appropriate recommendations will be incorporated into the final unit design cards. If soil stability problems or questions arise during road construction and timber harvest, a soil resource specialist will investigate and provide prescriptions to deal with the specific situation. Additional mitigation measures to control erosion are discussed in the *Water, Fish, and Fisheries* section of this chapter.

The new Forest Plan (1997) includes additional standards and guidelines designed to minimize adverse impacts to the soil resource. Timber harvest and road construction operations on steep slopes above are good examples. Additionally, buffering of Class III streams as required by Riparian standards and guidelines are designed to minimize risk to soil and other resources. Implementation of timber harvest and road construction will be fully consistent with the Forest Plan.

Monitoring

Implementation monitoring for the soil resource is related to soils and to water quality issues. The timber sale contract administrator, as the person with day-to-day project contact, will be primarily responsible for ensuring the implementation of BMPs as stated in the unit cards. After avoidance of hazardous soil areas, the main BMPs to protect the soil resource are directional falling of trees away from streams and yarding trees away from streams (split yarding) to minimize soil disturbance near streams.

The Forest Plan includes a Monitoring Plan with specific monitoring questions relating to the implementation and effectiveness of BMPs and standards and guidelines for protecting fish habitat, soil, and water resources. Harvest units and roads will be selected from this Project Area for field monitoring as part of that Monitoring Plan.

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Wetlands, Floodplains, and Riparian Areas

Key Terms

Aquatic ecosystems—the stream channel, lake or estuary bed, water, biotic communities, and the habitat features that occur therein.
Estuarine—deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land, but which have open, partly obstructed or sporadic access to the open ocean, and in which ocean water is diluted by freshwater runoff.
Hydrophytic vegetation—plants typically found in wetlands and dependent upon wetland moisture regimes for growth and reproduction.
Muskeg (peatlands)—a type of bog that has developed in depressions, or flat areas, poorly drained, acidic, with organic soils that support vegetation that is predominantly sphagnum mosses and heaths.
Primary succession—vegetation development that is initiated on surface exposed for the first time, which has never before supported vegetation.
Riparian areas—geographically delineable areas with distinctive resource values and characteristics that are comprised of a stream channel, lake or estuary bed, the water itself, and the plants that grow in the water and on the land next to the water.
Riparian ecosystems—a transition between the aquatic ecosystem and the adjacent terrestrial ecosystem; identified by soil characteristics or distinctive plant communities that require free or unbound water.
Riparian management area—land areas delineated in the Forest Plan to provide for the management of riparian resources.
Secondary succession—the process of reestablishing vegetation after normal succession is disrupted by fire, cultivation, timber harvest, windthrow, or any similar disturbance.
Wetlands—areas that are inundated by surface or ground water with a frequency sufficient, under normal circumstances, to support vegetation that requires saturated or seasonally saturated soil conditions for growth and reproduction.

Wetlands

Timber harvest and road construction will affect wetlands. The amount, frequency, and distribution of wetlands in the Project Area make it impossible to avoid road construction on wetlands. Additionally, forested wetlands are an important component of the forest land base. The acreage of wetlands harvested by watershed for the alternatives is shown in Table 4-4. Acres of wetlands are determined from the GIS soil mapping unit (SMU) layer. This gives the average percentage of wetlands (muskegs and forested) for the SMU in which the harvest unit occurs. Hence the acres of wetlands are the product of the unit acres and the wetland percentage for each soil type found within each unit.

Alternative 12 has the most calculated wetland inclusions followed by Alternatives 11, 13, and 10, in that order. High-value wetlands (which include estuarine wetlands, sedge muskegs, sphagnum muskegs, and wet forest/sphagnum muskeg complex) within harvest units range from 7 acres for Alternative 10 to 215 acres for Alternative 12. Note that the values are from GIS analysis and are maximum values.

In general, areas (2 acres or larger) of those wetland soils (Kaikli, Karheen, Kitkun, Maybeso) designated for protection by the ROD of the new Forest Plan (1997) were excluded from the proposed harvest units. However, because the Control Lake unit pool was field reviewed before these soils were designated for protection, larger inclusions may be present and may need to be

Table 4-4
Harvest Area on Wetlands by Alternative and Watershed (in Acres)

Name	Watershed	Alt. 10	Alt. 11	Alt. 12	Alt. 13
103-80-37	BT2A	0	5	5	5
103-70-03	BW1A	0	0	0	0
103-80-56	BW2A	0	0	0	0
Hatchery Creek	C20D	0	0	0	0
Logjam Creek	C21C	0	133	161	133
North Thorne River	C45D,C49B.27	0	31	31	31
Thorne River	C49B,C45D	0	0	0	0
Unnamed	C49B.0001	0	24	24	24
Goose Creek	C49B.10,.11,.12	95	172	172	172
Control Creek	C49B.20,.24,.25,.2	0	48	52	43
Rio Beaver	C49B.2100	143	150	170	150
Rio Roberts	C49B.2200	3	19	19	3
Upper Thorne River	C49B.2300	0	108	302	108
Paul Young Creek	C72A	1	1	1	1
Black Bear Creek	C93A	0	0	0	0
Steelhead Creek	C95B	169	284	322	306
Election Creek	C96A	0	23	23	23
Staney Creek	C97C,C99C,B59C	0	0	0	0
Shinaku Creek	D03B	118	232	232	232
103-60-05	D08A	0	86	227	0
Elevenmile Creek	D09A	0	0	0	0
Goodrow Creek	D10A	0	0	0	0
Unnamed	D11A	0	0	0	0
Nossuk River	D12A.01	0	28	28	7
Unnamed	D12A.0001	0	9	9	9
103-80-46	D14A	0	0	0	0
103-80-50	D15A	0	0	0	0
James Creek	D16A	0	0	0	0
Total High-Value Wetland		7	149	215	154
Total Other Wetland		522	1,204	1,564	1,094
Total Wetland		529	1,353	1,779	1,248

deleted from the units prior to harvest. Based on GIS analysis of associations and complexes containing these soils, the areas with the greatest likelihood of larger inclusions within units are the Logjam Creek and Upper Thorne River watersheds. Units of particular concern in these watersheds are 575-408, 575-413, 575-418, 575-419, 577-416, 577-417, 577-418, 577-423, and 577-426. Outside of these two watersheds there are scattered units of concern. Of particular note, because of the high percentage of the units mapped with soil associations or complexes containing protected soils, are units 578-401 in the North Thorne River Watershed, 595-413 in the Steelhead Creek Watershed, and 596-407 in the Control Lake Creek Watershed. Of the 12 units identified as most likely to contain inclusions of protected soils, none are included in Alternative 10, eight are included in Alternatives 11 and 13, and all 12 are included in Alternative 12. These and all other units in the selected alternative would need to be reviewed and adjusted if large inclusions are found.

Timber harvest on forested wetlands will likely initially increase soil moisture because of reduced transpiration resulting from tree removal. This effect will occur until trees are re-established. Revegetation of forested wetland sites are expected to occur in the same time frame as for other forested sites, usually within 3 to 5 years. Consequently, long-term effects to forested wetlands are expected to be minor. Timber site productivity on wetland soils, however, is typically lower than on better-drained sites. Growth rates on wetland sites are expected to be lower than on nonwetland sites, and merchantable timber may not be available in a 100-year rotation. This is more likely to be the case on the Kaikli, Karheen, Kitkun, and Maybeso soils.

The most direct effect on wetlands in the Project Area would be the fill associated with road construction. The construction of roads would permanently remove the roaded portions of the wetlands from production thereby eliminating their biological functions. Road routing for the Control Lake Project attempted to avoid wetlands; however, the extent and distribution of wetlands made this impossible. A number of BMPs and mitigation measures deigned to minimize effects on wetlands have been incorporated into road design (see Chapter 2, mitigation measures). Table 4-5 shows the acres of road construction by wetland type for the alternatives by watershed. The average disturbance width is calculated at 75 feet; however, the disturbance width on wetlands is generally much narrower than on steep slopes and the actual width should be less. Consequently, the road disturbance acres shown are maximum values. Alternative 12 has the highest acres of wetland affected, followed by Alternatives 11, 13, and 10, in that order. In regards to high-value wetland acreage, the alternatives rank the same as for all wetlands.

Silvicultural operations, such as harvesting trees, are generally exempted from Army Corps of Engineers permitting requirements. The construction or maintenance of forest roads in support of silvicultural practices, and temporary roads for moving mining equipment, are also generally covered under this exemption for the discharge of dredged or fill material into waters of the United States. This exemption is contingent on the construction and maintenance being conducted in accordance with the federal BMPs as stated in 33 CFR 323.4(a)(6).

Upper Hatchery Creek south of Lake Galea

Table 4-5
Road Construction on Wetlands by Alternative and Watershed (in Acres)[1/]

Name	Watershed	Alt. 10	Alt. 11	Alt. 12	Alt. 13
103-80-37	BT2A	0	0	0	0
103-70-03	BW1A	0	0	0	0
103-80-56	BW2A	0	0	0	0
Hatchery Creek	C20D	0	0	0	0
Logjam Creek	C21C	0	29	61	29
North Thorne River	C45D,C49B.27	0	8	8	8
Thorne River	C49B,C45D	0	0	0	0
Unnamed	C49B.0001	0	4	4	4
Goose Creek	C49B.10,.11,.12	13	38	38	38
Control Creek	C49B.20,.24,.25,.26	1	8	15	0
Rio Beaver	C49B.2100	39	41	52	30
Rio Roberts	C49B.2200	5	8	9	4
Upper Thorne River	C49B.2300	0	10	54	9
Paul Young Creek	C72A	2	2	2	2
Black Bear Creek	C93A	0	0	0	0
Steelhead Creek	C95B	21	51	57	57
Election Creek	C96A	0	9	9	9
Staney Creek	C97C,C99C,B59C	0	3	3	3
Shinaku Creek	D03B	18	22	22	22
103-60-05	D08A	0	42	9	0
Elevenmile Creek	D09A	0	0	0	0
Goodrow Creek	D10A	0	0	0	0
Unnamed	D11A	0	0	0	0
Nossuk River	D12A.01	0	0	0	0
Unnamed	D12A.0001	0	2	2	2
103-80-46	D14A	0	0	0	0
103-80-50	D15A	0	0	0	0
James Creek	D16A	0	0	0	0
Total High-Value Wetland		5	39	57	37
Total Other Wetland		94	237	356	179
Total Wetland		99	276	413	216

1/ Assumes a 75-foot wide road bed; actual disturbance is normally substantially less than this. Includes the road area within harvest units.

Estuaries

Forest-wide standards and guidelines require that estuaries be buffered by a 1,000-foot no-harvest zone. Road construction should avoid this buffer but can occur when there is no suitable alternative. During prefield layout of roads and harvest units, estuarine buffers were avoided. The Control Lake Project has no proposed roads or timber harvest within the buffer, which eliminates any direct effects to the estuarine zone. Sediment from road construction and mass wasting that enters streams is eventually delivered to the estuarine zone. As discussed below in the sediment section, the amounts of such sediment are considered to be minimal. In addition, estuaries are natural deposition zones for fine-grained sediments and all aquatic organisms are adapted to this process. The small amounts of extra sediment that will be delivered because of road construction and timber harvest would have minimal biologic effects and would not adversely affect biotic populations.

Floodplains

The high density of streams in the Project Area precludes avoiding all floodplains during timber-harvest-related activities. Environmental consequences in floodplains are generally limited to road construction during which both direct and indirect impacts to floodplains could occur. To minimize adverse effects on floodplains, all stream crossings have bridges and culverts sized so as not to impede floodwater. Consequently, there should be no loss of floodplain function. There will be no human occupancy of floodplains. The only floodplain development proposed in the Project Area is stream crossings. Table 4-6 shows the number of road crossings of Class I stream floodplains by watershed for the alternatives. Road crossings of Class I stream floodplains range from 41 for Alternative 12 to 9 for Alternative 10. Steelhead Creek watershed has 5 to 6 Class I crossings in all alternatives. Goose Creek, Rio Beaver Creek, Paul Young Creek, Steelhead Creek, and Shinaku Creek are the only watersheds with crossings in all alternatives. The unnamed watershed adjacent to Elevenmile Creek (DO8A) has 7 crossings in Alternatives 11 and 12, but none in Alternatives 10 or 13.

Table 4-6
Number of Floodplain Road Crossings of Class I Streams by Alternative[1/]

Watershed	Watersheds	Alt. 10	Alt. 11	Alt. 12	Alt. 13
Hatchery Creek	C20D	0	0	0	0
Logjam Creek	C21C	0	2	8	2
North Thorne River	C49B.27	0	0	0	0
Goose Creek	C49B.10	2	5	5	5
Control Creek	C49B.20,.24,.25,.26	0	4	5	0
Rio Beaver Creek	C49B.21	4	3	4	3
Rio Roberts Creek	C49B.22	0	1	1	0
Upper Thorne River	C49B.23	0	0	4	0
Paul Young Creek	C72A	1	1	1	1
Steelhead Creek	C95B	1	2	2	2
Shinaku Creek	D03B	1	4	4	4
103-60-05	D08A	0	7	7	0
Elevenmile Creek	D09A	0	0	0	0
Nossuk River	D12A.01	0	1	0	0
TOTAL		9	30	41	17

1/ Unlisted watersheds do not have Class I floodplain crossings.

Riparian Management Areas

All riparian management areas as defined by TLMP 1997 will be included in no-harvest buffers. Buffers will be extended or harvest prescriptions modified adjacent to the buffers to assure that riparian and water resource management objectives are met. Table 4-7 in the Water, Fish, and Fisheries section lists the number of road crossings anticipated in each of the action alternatives.

Mitigation

Wetlands, Floodplain, Riparian Management Area

Mitigation measures designed to protect wetland areas involved, to the extent possible, the avoidance of muskegs during office planning and field reconnaissance. Additionally, in some cases, suspension is required during logging and wetland buffers for wildlife are prescribed. Field layout of road systems allowed site-specific identification of small drainages in wetlands requiring culverts and the road segments requiring additional culverts and permeable subgrades to maintain water circulation. Culverts and permeable subgrade materials are required when roads cross wetlands; these road segments are identified on the road design cards. Additionally, the use of BMPs in both construction and maintenance ensures that flows, circulation patterns, and chemical and biological characteristics of the wetlands' water would be minimally impaired. Implementation of these procedures are required to maintain the physical and chemical functions of wetlands (EPA, 1993; USDA Forest Service, 1995a).

Floodplains will not be harvested because they are part of the riparian buffer of Class I and Class II streams. Road systems, however, will cross floodplains. To minimize adverse effects, the frequent placement of culverts and bridges is indicated on the Road Cards. These culverts and bridges prevent the road prism from inhibiting the flow of floodwaters (EPA, 1993).

Under the 1997 TLMP Revision, riparian management areas are protected from harvest by no-cut buffer systems.

Buffers for Class I, II, and III streams are susceptible to blowdown after harvest. Prevention and minimization of blowdown was developed using techniques described in the Southeast Alaska Guide for Reducing Wind Damage (Harris, 1989). The applied techniques use unit boundaries and harvest types, which incorporate partial retention around the unit perimeter, to reduce risk. The Ketchikan Area is currently monitoring blowdown in stream buffers to determine the effectiveness of the buffers and other techniques (USDA Forest Service, 1992f). One function of no-harvest buffers on streams is to maintain the supply of large woody debris to the stream. Windthrow is the most common source of natural large woody debris loading (Gregory and Ashkenas, undated). Consequently, the blowdown of portions of buffer strips merely changes the timing of debris input (Gregory and Ashkenas, undated). Catastrophic blowdown of long lengths of buffer on Class I streams could reduce long-term input of LWD. If catastrophic blowdown creates a detrimental condition, e.g., barriers to anadromous fish, modification of the debris accumulation should be considered on a case-by-case basis.

Cumulative Effects

The estimation of cumulative effects for the Project Area assumes that the level of harvesting would remain relatively constant over the rotation period of 100 years. Cumulative effects of these actions on wetlands, floodplains, and riparian areas would then be proportional to the level of harvest and road building that occurred on wetlands, the amount of road building over floodplains, and the amount of timber harvest in Riparian Management Areas.

The cumulative effects of this harvest to forested wetlands is anticipated to be minimal. Revegetation of forested wetland sites occurs in the same timeframe as other forested sites, usually within 3 to 5 years. Consequently, long-term effects to forested wetlands are expected to be minor. Since growth rates on forested wetlands are expected to be lower than on nonwetland forest sites, merchantable timber from these acreages may not be available in a 100-year rotation.

Road construction on wetland sites will use culverts to minimize disruption of water flow and permeable subgrade materials to avoid restricting the natural movement of water. These measures will ensure that the hydrological, chemical, and biological functions of wetlands would be minimally impaired. The roadbed overlying wetlands will remove the area from production and eliminate their biological functions. Ongoing efforts to avoid wetlands during road locations will continue.

Cumulative effects on floodplains will be minimal. Future timber harvest on floodplains is not anticipated to occur. Road building on floodplains will occur. Proper road location, and bridge and culvert design will minimize the effects on flooding and hydrologic connectivity of the floodplain and river system.

In future entries, effects on Riparian Management Areas will likely occur at levels similar to the proposed entry in the Control Lake project. Riparian Management Areas will receive no timber harvest, which should produce minimal effects.

Monitoring

Routine implementation monitoring will be conducted by the timber sale administrator and road inspectors, who will be primarily responsible for ensuring the implementation of procedures specified on the unit and road cards. Culverts, permeable subgrade materials, buffers, and controlled felling and yarding of trees away from streams are the BMPs designed to protect wetlands, floodplains, and riparian areas. Units and roads from this project will contribute to the field monitoring done in association with the Forest Plan Monitoring Report. This Monitoring Plan includes specific questions regarding the implementation and effectiveness of wetland standards and guidelines.

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Water, Fish, and Fisheries

Key Terms

Alevin—newly hatched salmon that are still attached to the yolk sac.
Anadromous—fish that ascend from the sea to breed in freshwater streams.
Aquatic Habitat Management Unit (AHMU)—areas for managing the resources associated with streams and lakes.
Best Management Practices (BMPs)—land management methods, measures or practices intended to minimize or reduce water pollution.
Channel types—the defining of stream sections based on watershed runoff, landform relief, and geology.
Estuary—relatively flat, intertidal, and upland areas where saltwater meets fresh water, as at the heads of bays and the mouths of streams.
Large woody debris (LWD)—any large piece of relatively stable woody material having a diameter of at least 10 centimeters and a length greater than 1 meter that intrudes into a stream channel; also called Large Organic Debris (LOD).
Management Indicator Species (MIS)—species whose population changes are believed to best indicate the effects of land management activities; fish MIS in the Polk Inlet Project Area are coho and pink salmon and Dolly Varden char.
Mitigation—measures designed to counteract environmental impacts or to make impacts less severe.
Resident fish—nonmigratory fish that complete their entire life cycle in fresh water.
Salmonid—refers to the group of fishes to which salmon belong.
Sediment—water-transported earth materials.
TTRA Buffers—a no-harvest zone at least 100 feet in width on each side of all Class I streams and Class II streams which flow directly into a Class I stream.
V-notch—a deeply incised, narrow valley along a drainage with a characteristic "V" shaped cross-section.
Watershed—area that contributes runoff water to a waterway.

Direct and Indirect Effects to Water Resources

Effects to water resources are discussed below in regard to hydrology, water quality, and consumptive water uses.

Water Resources Hydrology

Timber harvest alters basin hydrology because it affects transpiration, the interception and evaporation of rainfall, snow accumulation and melt, and soil structure and resultant water infiltration and subsurface transmission rates (MacDonald, 1991). Though changes in stream flow are expected, their direction and magnitude vary and specific effects are not easily predicted. Generally, the larger the percentage of a watershed harvested, the greater the effects on stream flow. In some studies, a harvest of approximately 25 to 35 percent of basin area is required within a period of 5 to 15 years before effects on mainstem flow are noted (Rothacher, 1970, 1973; Harr et al., 1979; Duncan, 1986). A study of the response of the Maybeso watershed on Prince of Wales Island to timber harvest showed no significant changes in stream flow when 25 percent of the basin was harvested (James, 1956; Meehan et al., 1969). An analysis of the Staney Creek basin on Prince of Wales Island showed increases in mean and summer low flows (base flow) when harvest reached between 20 to 25 percent of the basin area (Bartos, 1989).

Though timber harvest has generally been shown to produce increases in streamflow, Hicks et al. (1991) present long-term data from central Oregon that shows decreases in flow during summer low flow periods. In a completely harvested, 237-acre watershed, water yield increased above that of a control watershed for approximately 8 years. For the next 19 years of record, late summer water yield decreased below that of the control watershed. Hicks et al. (1991) consider this decrease to be due to the dominance of alder in the riparian zone because the alder produced an increase in transpiration over that of conifer-dominated vegetation. In the same study, a 25 percent patch-cut, 249-acre watershed showed increases in late summer water yield for 16 years after harvest, returning to preharvest levels for the next 10 years of record. Besides the smaller percentage of harvest, the riparian zone of this watershed was not dominated by alder after harvest (Hicks et al., 1991).

Rapid melting of shallow snowpack by rainstorms can result in higher rates of water input to soil and streams than would occur during rainstorms alone. The elevational range over which snow might accumulate and melt, perhaps several times in one season, is known as the transient snow zone. Studies in Oregon, Washington, and southwestern British Columbia show that timber harvest in the transient snow zone could increase the magnitude and peaks of winter runoff (Harr, 1986; Harr et al., 1989; Golding, 1987).

Although timber harvest usually increases runoff and peak flows, Cheng (1988) documented the opposite effect in southern British Columbia. In that case, logging had compacted the soil, delayed water infiltration, and slowed water transmission through soil macropores.

Stream flow increases from timber harvest which could significantly affect sediment transport cannot be accurately predicted with the information available. For watersheds potentially affected by the Control Lake Project, cumulative watershed areas harvested from 1969 to 1998 range from 0 to 17 percent with 6.9 percent being the average percentage over all watersheds in the Control Lake Project Area (see *Cumulative Effects* section). With implementation of the action alternatives, cumulative harvest percentages for these watersheds would range up to 18 percent, with 7.4 to 8.8 percent being the average percentage over all Project Area watersheds. Effects are expected to be greater in small catchments in which harvest units make up a proportionally larger amount of the watershed. In most alternatives, watersheds BT2A, Goose Creek, Thorne River (C49B), Steelhead Creek (C95B), and Election Creek (C96A) have percentage harvests near or greater than 15 percent. Though these harvest levels are below documented thresholds, these basins may experience low to moderate increases in stream discharge quantities.

Decreases in late summer low flows are not anticipated from the harvesting that occurs during this entry in the Project Area. Harvest levels of 100 percent of a watershed at one entry, such as the harvest that produced the low flows documented by Hicks et al. (1991), will not occur. Alder domination of regrowth tends to occur on floodplains sites where ground disturbance allows its seeds to germinate on bare mineral soil. Floodplains are predominantly associated with Class I, and to a lesser extent with Class II, streams. The placement of 100-foot buffers (minimum) on Class I and Class II streams, reduces the chance for alder establishment on floodplains. Alder does not dominate the riparian zone of Class III streams. Late summer low flows may be reduced in watersheds that were harvested prior to the establishment of Standards and Guidelines which prohibit harvest on floodplain soils. These effects might occur in the watershed of Steelhead Creek, Election Creek, and Goose Creek which have floodplains with a significant alder component. Because Southeast Alaska has a higher precipitation regime and lower summer air temperatures than central Oregon, effects in this region are expected to be less. Alder can become established in the riparian zone of Class III streams after timber harvest if mineral soils are exposed. Present buffers and yarding specifications for Class III streams are sufficient to maintain ground cover soil quality standards that will prevent or minimize alder domination of these sites.

Water Quality

Water quality is discussed in regard to stream sediment, water chemistry, stream temperature and dissolved oxygen, and consumptive use.

Stream Sediment

Harvest Units

The amount of soil disturbance in harvest units was estimated based on logging method. The acreage harvested by each method was tabulated for each watershed. Based on the percent disturbance for each type of logging, the total area disturbed per watershed was summed. The acres of potential soil disturbance are shown in Table 4-1.

In general, surface soil erosion that occurs within timber harvest units has a limited possibility for contributing sediment to streams. The main BMPs to minimize soil disturbance near Class III streams are buffers, controlled felling of trees away from streams, and yarding these trees away from the streams (split yarding). Site-specific recommendations for controlled felling and split yarding are contained in the unit cards.

Road Erosion

Construction of new roads and reconstructing old roads exposes cutbank soil and roadbed materials to erosion which increases sediment delivery to streams. The largest component of management-caused sediment input to streams is from roads (Reid and Dunne, 1984). Specific quantities of sediment cannot be predicted; consequently, three methods are used to evaluate the alternatives and their relative risk of sediment delivery to streams. First is the acres of new road proposed. Second is the number of proposed road crossings of streams. Third is an evaluation of the specific potential for sediment delivery to streams of all harvest units and roads.

Table 4-2 shows the acres of new road proposed by major watershed including quarries and landings. Watersheds with the highest road acreage have the greatest susceptibility for potential road-related sediment delivery. This table shows that Alternative 12 has the highest acres of new roads followed by Alternatives 11, 13, and 10. Steelhead Creek, Rio Beaver, and Watershed DO8A (adjacent to Elevenmile Creek) have the largest area (some are less than 100 acres now in Alternative 12) of proposed new roads under Alternative 12. By converting road area to a percentage of each watershed area, the relative magnitude can be evaluated independent of watershed size. For these three watersheds, the percentage area of new roads under Alternative 12 would be 0.5, 0.9, and 1.3 percent of the total watershed acreage, respectively.

Standards and Guidelines do not define a maximum percentage of a watershed that may be converted to a roaded condition. A study by Cederholm et al. (1981) showed that fine sediments began to accumulate in downstream spawning gravels when logging roads in their study area on the Olympic Peninsula in Washington State exceeded 2.5 percent of the basin area. However, these effects were directly attributed to older roads (in that case, built before 1972) constructed without BMPs such as end hauling road cut materials on steep slopes, grass seeding cut and fill areas, and energy dissipation structures at culvert outfalls. Such BMPs are specified in Forest-wide Standards and Guidelines on the Tongass National Forest and will significantly reduce the road related risk to water quality. Higher percentages of roaded acres for a given watershed, however, do indicate a higher risk of impact from roads. Consequently, BMP implementation in these watersheds is especially important. Older roads occur in the Project Area; in these areas on-going road maintenance is important.

The number of road stream crossings is shown in Table 4-7. These data show that Alternative 12 has the highest total number of crossings (216 or about 2.8 stream crossings per mile of new road), and the highest potential risk of sediment delivery to streams. In Alternatives 11, 12, and 13, Shinaku Creek and Steelhead Creek have the highest number of road crossings (35 and 59, respectively). Alternative 10 has the fewest total stream crossings.

Table 4-7
Number of Road Crossings of Class I, II, and III Streams by Alternative

	Alternative 10	Alternative 11	Alternative 12	Alternative 13
Class I	9	30	41	17
Class II	10	25	31	14
Class III	43	120	144	95
Total	**62**	**175**	**216**	**126**

Once fine sediment is mobilized on the road bed it can be delivered to roadside ditches, carried to a stream, and degrade water quality. Minimizing this sediment delivery is of fundamental importance in road location and design, BMP implementation, and road maintenance. The following discussion evaluates the risk values in terms of the potential sediment delivery volume which is what affects water quality.

In a study of the Polk Inlet area on Prince of Wales Island, Kahklen (1994) documented 15 tons per mile per year of fine sediment production from heavy road usage (six to eight loaded logging trucks per day). This value shows that with similar use approximately 60 times less sediment is produced at the Polk Inlet study site than at an Olympic Peninsula site (Reid and Dunne, 1984). Kahklen (1994) indicated that about 35 percent of the roadside ditches in Polk Inlet drained to a stream; approximately 45 percent less than the roadside ditch delivery at Reid and Dunne's (1984) study site. In the Polk Inlet area culvert spacing averaged 150 to 300 feet, partially explaining the reduced drainage to stream channels. Consequently, the volume of potential yearly sediment delivery to streams documented by Kahklen (1994), under similar road usage, is approximately 130 times smaller than the values documented by Reid and Dunne (1984).

The comparative values discussed above highlight the importance of implemented BMPs in minimizing effects to stream channels (USDA Forest Service, 1995a). Data presented in USDA Forest Service (1995a) for the Old Franks drainage in the Polk Inlet Project Area on Prince of Wales Island show that only 4 out of 206 culverts (2 percent of the total), were not fulfilling their cross-drain function. BMPs implemented at this level of effectiveness will significantly reduce the potential for sediment delivery to streams and related water quality degradation. Additionally, in the higher elevations in Southeast Alaska actual road use by logging trucks occurs for only about 8 months, rather than all year long (as in lower elevations), further reducing the absolute amount of sediment delivery to streams.

Documented rates of sediment delivery when timber harvest includes use of BMPs (Mitigation Measures F2, F5, F6, F7, F8) are within the range of normal baseline conditions of streams in Southeast Alaska (Paustian, 1987). The use of road BMPs (Mitigation Measures F2, F8, F10) are similarly expected to reduce the impact of sediment eroded from roads. For example, in a review of North American forestry practices, Binkley and Brown (1993) conclude that while use of BMPs may not prevent an increase in erosion, their use kept increases of sediment concentration to a minimum. Consequently, sediment delivery to streams in the Project Area is expected to be within state standards.

Water Chemistry

Significant alterations to water chemistry as a result of timber harvest are not expected. The use of motor vehicles and motor-driven timber harvest equipment means there is potential for fuel spills which might reach streams. Seeding and fertilizing road cutslopes for erosion control may allow the influx of fertilizer to stream systems. Under normal operating conditions, these nontimber harvest actions are expected to have only a minor potential to affect water quality, and water quality standards will not be exceeded.

Stream Temperature and Dissolved Oxygen

The maintenance of buffers on Class I, Class II, and Class III streams should minimize any stream temperature increases. Stream temperatures in the Project Area seldom exceed the State standard of a maximum 68°F. The effects of removing a small area of streamside vegetation are generally negligible. Lower elevation streams with a southerly aspect would experience greater temperature changes than higher elevation streams with a northerly exposure. Significant decreases in dissolved oxygen because of increased stream or lake temperatures are not expected. The application of appropriate stream buffers and other BMPs would maintain sufficient stream and lake canopy closure and mitigate any potential for significant temperature increases (see *Mitigation* section).

Lakes generally serve to buffer stream temperature extremes, with their effectiveness dependent on lake bathymetry and size and stream flux entering and exiting the lake. The numerous lakes in the Project Area may affect how stream temperatures respond to harvest activities. Information presented in the Chapter 3, *Water, Fish, and Fisheries* section demonstrates the increased temperature of lakes compared to Class I streams. These measurements were made at the shallow surface of lake edges and probably overestimate lake temperatures.

Addition of organic material which increases the biological oxygen demand and reduces the dissolved oxygen availability should be mitigated by buffers along Class I, II, and III streams.

Consumptive Water Use

Timber harvest would not have any impact on the availability of water to those sites in the Project Area where local consumptive water use occurs. No harvest is planned for the immediate vicinity of recreational sites on National Forest System lands. The Forest Service cabin on Lake Galea in the Honker Divide area is within a Scenic River and Old-Growth Habitat Reserve LUD, where timber and road building activity is not allowed. Similarly, planned activities near the Control Lake cabin, Black Bear Lake cabin and Eagles Nest campground are not expected to affect water use.

Direct and Indirect Effects to Fish and Fisheries

Because of mitigative actions taken and planned for implementation, no anticipated significant impacts will occur to fisheries resources from any of the alternatives. The remaining environmental effects of timber harvest and road construction on fish and fisheries resources may be either direct, indirect, or cumulative. Actions that have effects on fish include increased sediment inputs to streams, temperature and dissolved oxygen changes, changes in inputs of LWD, and miscellaneous actions related to road construction. All of the action alternatives have some associated risk of effects to streams and fisheries resources; the magnitude of risk is generally proportional to the extent of application of stream buffer prescriptions and BMPs, the miles of new or reconstructed road, and the number of stream crossings required.

Sediment Inputs to Streams

Considering the protection built with TTRA and other expanded-width buffers and implementation of BMPs, none of the activities should significantly increase impacts to fisheries from increased sediment. However, risks from sediment still remain to these resources, with the highest risks occurring where the greatest proportion of near stream disturbance and, secondarily, watershed disturbance occurs (see Risks, this section).

Increased sediment delivery may directly or indirectly adversely affect the survival of salmonids by factors such as reduced egg survival in stream gravel, reduced food supply, and direct mortality (see *Water, Fish, and Fisheries* in Chapter 3). Sediment input is affected by quantity of road miles, number of stream crossings, slope, and total harvest acres. The effects of the alternatives on these factors are discussed above under Water Quality in this section and in the Chapter 4 *Wetlands, Floodplains, and Riparian Areas* section.

The number of stream crossings (bridges and culverts) is an index used to assess the potential for erosion and increased sediment inputs to streams. Table 4-8 shows the number of stream crossings, by stream class. Steelhead Creek watershed has the most stream crossings, making up a total of 59 for Alternative 12. Fifty-four of these stream crossings occur on Class III streams while only 2 stream crossings occur on Class I streams. Because there is no concentration of road crossings in one subwatershed, the effect of increased sediment into the stream should be low.

Road crossings of Class I and II streams remove trees for a maximum width of about 75 feet on both sides of the stream which directly affects the availability of LWD at these sites (see Table 4-8). However, the relatively small amount of Class I and II streamside vegetation removed (less than 1 percent of riparian management area in Class I and II streams) indicates that effects to fish habitat for any of the alternatives would be small.

Temperature and Dissolved Oxygen

The application of appropriate stream and lake buffers and other BMPs would maintain sufficient stream and lake canopy closure and avoid any potential for significant temperature increases.

Miscellaneous Effects of Road Construction

Miscellaneous effects of road construction include potential effects on upstream fish passage and increased access to fisheries resources with a resulting increase in fishing pressure and exploitation rates.

Upstream fish passage, both for adult and juvenile salmon and trout, can be blocked when culverts are used to cross moderate- and high-gradient Class I or II streams. Proper implementation of BMPs for culvert installation will eliminate these potential impacts. Occasionally, culverts develop vertical drops at the downstream ends that fish cannot ascend. Water velocity within the culvert might be too fast for fish to swim against. To reduce these risks, culverts must be of the proper size and type for the particular stream, and must be correctly oriented and installed.

Even though culverts will be selected, installed, and monitored regularly to maintain fish passage, there is still the possibility that they will be undercut by the stream and might fail to allow passage of fish at lower flows, or that they will become blocked or fail entirely at some point in their service life. The risk of reduced fish passage is roughly proportional to the number of culverts used. This risk is somewhat greater in watersheds that have more Class I and II stream crossings (see Table 4-7). However, Forest Service BMPs for road construction require that culvert installation supply adequate fish passage to Class I and II streams. Implementation of BMP guidelines and proper monitoring reduce risk so significant impacts to fish passage in the Project Area would not occur.

A potential indirect effect of new road construction on fish is to improve the roaded access to streams and lakes, resulting in the potential for increased subsistence harvest and recreational use of local fisheries resources. Road closures will reduce accessibility to some of the more important fisheries. The roaded access to some lakes would increase. For example, Angel Lake has a proposed roaded area which will increase access to the lake. The harvest units near Angel Lake are contained in all alternatives. Both the creek and lake support coho, chum, pink and sockeye salmon, cutthroat, rainbow and steelhead trout and Dolly Varden char, all of which may be vulnerable to increased fishing pressure.

Increased lake and stream access might also increase fisheries harvest rates in the Shinaku watershed. The closest harvest unit is about 1 mile from the lake and the nearest road is approximately 1.5 miles from the lake. All new roads in the Shinaku watershed are planned to be closed to normal vehicular traffic.

Cumulative Effects

Cumulative Watershed Effects Analysis

The Control Lake project has been designed to meet all applicable Forest Plan standards and guidelines and BMPs. The standards and guidelines include new riparian management direction and have incorporated all the recommendations made in the Anadromous Fish Habitat Assessment report for additional protection. The AFHA report is the most comprehensive and credible scientific review of the measures needed to protect fish habitat on the Tongass National Forest. The application of Forest Plan standards and guidelines are expected to assure no short- or long-term significant effects will occur on fish habitat or fish resources. Table 4-8 shows the cumulative harvest before and after project implementation by Project Area watershed. None of the watersheds would exceed 18.2 percent cumulative harvest with project implementation.

Mitigation

Mitigation measures to reduce the magnitude of potential effects on water quality, streams, fish, and fisheries resources include planning, application of BMPs, application of appropriate stream buffer prescriptions, and road-access management prescriptions. These topics are discussed below. Appendix C and the unit and road cards (Appendices D and E) identify which mitigation measures apply to each harvest unit and road segment.

Water Quality

Mitigation for protecting water quality occurs through both planning and the implementation of BMPs. These mitigation measures are documented in Chapter 10 of the Forest Service Soil and Water Conservation Handbook (FSH 2509.22) and are discussed in the Alaska Nonpoint Source Pollution Control Strategy. Mitigation of sediment inputs by roads to streams is accomplished through transportation planning, route location, contract preparation, and contract administration (Mitigation Measures F1 and F2). These procedures allow avoidance of hazardous areas during planning, the field documentation and avoidance of additional hazardous sites, the incorporation into the contract of site-specific recommendations, and contract administration to ensure compliance.

Other mitigation measures discussed in the FSH 2509.22 include those in the following discussion. Where surface-disturbed areas on roads are subject to erosion, they will be stabilized using techniques such as water-barring, cross-draining, outsloping, or other suitable means. To prevent water from flowing long distances over exposed ground, measures such as ditches,

Table 4-8

Cumulative Harvest in the Project Area Since 1969 (% of Total Area) by Major Watershed and Alternative

Name	Watershed[1/]	% Previously Harvested 1969-1998 (Alt. 1)	Cumulative % Harvested Alt. 10	Alt. 11	Alt. 12	Alt. 13
103-80-37	BT2A	13.3	13.3	14.9	14.9	14.9
Logjam Creek	C21C	8.4	8.4	9.4	9.7	9.4
N. Thorne River	C45D,C49B.2700	11.0	11.0	12.4	12.4	12.4
Thorne River	C49B	17.2	17.2	18.2	18.2	18.2
Goose Creek	C49B.10,.11,.12	12.2	13.7	15.3	15.3	15.3
Control Creek	C49B.20,.24,.25,.26	3.1	3.1	3.8	4.0	3.5
Rio Beaver	C49B.2100	4.6	7.9	8.2	8.7	8.2
Rio Roberts	C49B.2200	0.8	0.8	2.5	2.5	0.8
Upper Thorne R.	C49B.2300	2.3	2.3	3.7	5.5	3.7
Paul Young Creek	C72A	0.0	1.1	1.1	1.1	1.1
Steelhead Creek	C95B	14.5	16.0	17.0	17.3	17.2
Election Creek	C96A	14.1	14.1	15.6	15.6	15.6
Shinaku Creek	D03B	2.9	3.8	6.7	6.7	6.7
103-60-05	D08A	0.1	0.1	2.9	6.3	0.1
	D12A.01	7.3	7.3	8.1	8.1	7.7
Nossuk River	D12A.0001	7.0	7.0	8.4	8.4	8.4
Project Area Total		6.9	7.4	8.4	8.8	8.2

1/ Only watersheds with harvest acres under one of the alternatives are listed.

cross-drain spacing, and culverts will minimize soil erosion and sedimentation. The seeding and fertilizing of cut slopes, fill slopes, and other disturbed areas will prevent soil erosion and sedimentation. Landings will be located and designed for erosion control; they will have proper drainage during use and shall be ditched or sloped to permit drainage and dispersion of water when abandoned. These procedures are broadly grouped as Mitigation Measure F8.

The above procedures have been found to be generally effective in mitigating sediment inputs to streams (MacDonald, 1991; EPA, 1993). Stream buffer prescriptions and other BMPs related to streams are also applied and discussed below. Because these practices are relatively new, both implementation and effectiveness monitoring is being conducted and should be continued. Implementation and effectiveness monitoring procedures are discussed in Monitoring under this section.

In addition, watershed analysis indicates several subwatersheds as being at higher risk of road sediment input. These watersheds are: C49B.2100 (part of the Rio Beaver drainage); D12A.0100 (part of the Nossuk River drainage); C21C.0405 (Logjam Creek watershed); C49B, C49B.0001, and C49B.2100 (within the Rio Beaver watershed); C49B.2403 (Control Creek watershed); C49B.2701 (North Thorne River watershed); and D12A.0100 (see *Appendix D* of the Draft EIS). In these watersheds it is imperative that BMPs (including ongoing road and culvert maintenance) be fully implemented to protect water quality and fish habitat.

Stream Buffer Prescriptions and BMPs

Buffers zones and BMPs along streams (Mitigation Measures F5, F6, and F7) are techniques implemented to reduce physical impacts to stream water quality and habitat. The extent of their application across the Project Area provides a general indication of mitigation of potential effects on streams.

Implementation of buffer prescriptions will largely mitigate potential impacts to streams. Buffers applied at the planning stage are variable-width buffers (buffers greater or less than 100 feet wide). They are designed to be flexible and to provide the best level of protection to streams based on differences in channel type and stream class. Site-specific resource conditions, such as concern for windfirmness or adjacent hazard soils, resulted in additional widening of buffers beyond planned buffer widths. Stream segments with extended-width buffers benefit from a higher level of protection than the TTRA requires.

Stream buffers and BMPs have been found to be effective in mitigating stream temperature effects, sediment inputs, and loss of fish habitat (MacDonald, 1991; EPA, 1993; Binkley and Brown, 1993). In addition, long-term effectiveness monitoring is required by the Memorandum of Agreement (MOA) between the ADEC and the Forest Service (USDA Forest Service, 1992d).

Temperature Sensitivity

Canopy cover is an important factor governing stream heating and cooling. Lower elevation streams with a southerly aspect would experience greater temperature changes than higher elevation streams with a northerly exposure. Some streams because of their topography, watershed features, and orientation, could have temperatures over optimum during hot, dry summers. These same streams may be particularly susceptible to increased temperature if adjacent tree canopies are removed during timber harvest. The application of appropriate stream buffers and other BMPs would maintain sufficient stream and lake canopy closure and mitigate any potential for significant temperature increases for most streams.

Historical land management practices that occurred on both private and federal land in certain watersheds may also contribute to a streams unmanaged temperature sensitivity. A group of mainstem streams were highlighted primarily because of their southern exposure and low elevation. These streams are: Goodrow Creek, Elevenmile Creek, Shinaku Creek, Election Creek, Steelhead Creek, the North Thorne River, part of the upper Cutthroat Creek, Snakey Lakes, Stream 103-60-11, Stream 103-60-25, Stream 103-60-07, Stream 103-60-05, Stream 103-60-03, and James Creek. Though these mainstem streams may be susceptible to temperature change, they are currently protected by TTRA buffer requirements and will not be affected by timber practices.

An additional screening was conducted of potentially temperature sensitive Class III streams within harvest units in these watersheds. The following characteristics were evaluated: south-facing slopes, lack of immediate downstream forested stream buffers, historical and continued harvest activities, adjacency to other units not yet providing enough shade, and adjacency to ponds and muskegs (FSH 2609.24, Appendix 4). Assessment of potential temperature sensitivity included evaluation of unit cards, GIS mapping, orthophotos, and topographic maps. The units which contain these Class III streams are: 574-434, 547-435, 574-436, 578-402, 592-413, 594-416, 594-420, 595-406, 595-411, 595-414, 595-434. Mitigation measures prescribed for these units include slope break buffers plus additional buffer widths to meet site-specific objectives such as wind firmness.

Nossuk Creek has been considered a temperature sensitive stream (USDA Forest Service, 1993). This potential temperature sensitivity was identified because it is a wide stream with low flow velocities and little natural overhead shading of riparian vegetation. There are no Control Lake harvest units adjacent to Nossuk Creek. The road accessing unit 591-405 does cross one of the upper tributaries of Nossuk Creek. The amount of right-of-way clearing for the road will not have a significant influence on the riparian shading of this tributary.

Road Construction Timing, Culverts, and Road Access Management

Road construction would adhere to the standard "timing windows" to avoid potential adverse effects of increased sediment inputs to streams during periods of salmonid egg/alevin incubation (Mitigation Measure F10). The timing of construction for the Ketchikan Administrative Area are conservatively established to be June 1 to August 7 for pink and chum salmon, June 15 to September 1 for coho salmon, June 15 to August 15 for sockeye salmon, and July 18 through August 15 for steelhead trout. However, because of the variability of fish presence, abundance, and timing by system, the exact dates of allowable construction may vary from those presented. Additionally, site-specific techniques during low flow periods can extend the timing window. These construction restrictions are designed to protect coho, pink, and chum salmon and steelhead trout spawning by reducing in-stream bridge and culvert activity at times when eggs may be in the gravel and during smolt migration. Proper culvert selection and installation would minimize the risk of blocking fish passage; culverts would be monitored and maintained on a regular basis. Culvert installation and design should follow standard Forest Service BMPs for culverts (USDA Forest Service, 1979b). For larger streams, bridges may be more suitable to insure fish passage. Installation of project structural plate arch culverts are recognized as the most effective culvert design of fish passage (Furniss et al., 1991).

Logging Debris Management

Logging debris generally is removed from streams. Split yarding and controlled felling practices would prevent large amounts of logging debris from entering streams during logging and road-building operations. Existing LWD in stream channels would be left in place. Opportunities for fish passage barrier removal identified during routine monitoring would be evaluated (Mitigation Measure F11).

Monitoring

The April 1992 MOA between the ADEC and the Forest Service Alaska Region (USDA Forest Service, 1992e) is the basis for the maintenance of water quality and beneficial uses on the Project Area. BMPs are the primary means to mitigate sediment and other water quality effects to the water resource. BMPs are evaluated by implementation monitoring and effectiveness monitoring. BMPs are recognized as effective in maintaining water quality (ADEC, 1990; EPA, 1993). The forest-wide monitoring plan lists two monitoring activities specifically aimed at BMPs. One is directed at BMP implementation and the other is directed at BMP effectiveness. Additional monitoring of BMPs is included under fish and watershed monitoring activities. The Ketchikan Area Office and ADEC are currently coordinating to identify the specific procedures and protocols for documenting implementation monitoring on the Ketchikan Area. Additional monitoring is discussed in the Ketchikan Area Monitoring Strategy (USDA Forest Service, 1994).

Since BMPs have been designed and are presumed to meet State Water Quality Standards, they must be implemented as required and as instructed in the Alaska Nonpoint Source Pollution Control Strategy (ADEC, 1990) and Chapter 10 of the Forest Service Soil and Water Conservation Handbook. The timber sale contract administrator, as the person with day-to-day project contact, will be primarily responsible for ensuring the implementation of BMPs.

Monitoring includes both routine field observations and comprehensive monitoring projects. Routine monitoring includes visual observations and documentation. Again, the timber sale contract administrator, as the person with day-to-day project contact, is primarily responsible for routine monitoring. The visual observations include road runoff, proper culvert and bridge placement procedures, water turbidity at culverts and bridges, and revegetation.

Comprehensive monitoring includes, but is not limited to, evaluations that provide quantitative documentation. Comprehensive monitoring plans are currently being developed and discussed with ADEC. These comprehensive monitoring activities will follow procedures in the Alaska Nonpoint Source Pollution Control Strategy (ADEC, 1990) and the Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska (MacDonald, 1991).

Baseline monitoring, which describes the range and trends in temporal and spatial water quality variations, is a type of monitoring activity that is considered optional under the MOA (USDA Forest Service, 1992e). Baseline data does not exist for the Control Lake Project Area.

Analysis of water resource data at the watershed and subwatershed scale provides a geographic assessment of localities that may be targeted for monitoring. The Control Lake Fisheries and Watershed Resource Report (Rogers and Ablow, 1995) displays conditions and potential impacts by subwatershed in the Project Area. The subwatersheds displaying high proportions of the acres to be harvested containing wetlands, RMAs, high road concentrations, or cumulative harvest acres are good targets for monitoring efforts. They could contribute to determining the adequacy of Forest Service Standards and Guidelines and BMPs.

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Silviculture, Timber, and Vegetation

Key Terms

Advanced Regeneration—Natural conifer reproduction established beneath an existing forest canopy; comprised of trees ranging from 5 to 20 feet in height.
Allowable Sale Quantity—The maximum quantity of timber that may be sold in each decade from suitable scheduled lands covered by the Forest Plan.
Basal Area (BA)—The area of the cross section of a tree stem, or group of trees, measured at 4.5 feet above ground; usually presented as total square feet per acre.
Blind Lead—An area within a harvest unit that is difficult to yard (remove felled timber) with conventional cable logging systems on convex slopes.
Board Foot (BF)—Lumber or timber measurement term. The amount of wood contained in an unfinished board 1 inch thick, 12 inches long, and 12 inches wide.
Climax Plant Community—The final or stable biotic community in a successional series which is self-perpetuating and in dynamic equilibrium with the physical habitat; the assumed end point in succession.
Commercial Forest Land (CFL)—Land that is capable of producing continuous crops of timber (20 cubic feet per acre of tree growth annually, or at least 8 MBF/acre).
Ecosystem—all of the organisms in a given area interacting with the physical environment so that the flow of energy leads to an exchange of materials between living and nonliving parts within the system.
Even-Aged Management—The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. The age difference between trees in the canopy level usually does not exceed 20 percent. Clearcut, Shelterwood, or Seed Tree cutting methods produce even-aged stands.
Falldown—The difference between planned or scheduled harvest and that which is attained after implementation.
Forest Land—Land at least 10 percent occupied by forest trees of any size, or formerly having had such tree cover and not currently developed for nonforest use.
MBF—Thousand board feet.
MMBF—Million board feet.
Partial Cutting—Removal of selected trees within a forest stand in any variety of spatial patterns. This may include thinning, selective cutting, Shelterwood or an overstory removal.
Plant Association—A basic unit of vegetation classification based on land management potential, species composition, successional patterns, and the climax plant community.
Precommercial Thinning—The practice of removing some of the trees less than merchantable size from a stand to improve tree growing space and promote rapid growth. Trees will grow faster due to reduced competition for nutrients, water, and sunlight.
Reserve Trees—Merchantable or submerchantable trees and snags that are left within the harvest unit to provide biological habitat components over the next management cycle.
Shade Tolerance—Tree species that have physiological growth processes adapted to shaded environments Western hemlock is a shade tolerant species. Other tree species tolerance to shade may range from tolerant to intolerant.
Silvical Characteristics—Physiological and genetic characteristics of individual tree species and the ecological characteristics (biological and environmental factors) of the site which enable a specific species to be adapted to a particular and unique site.
Silvicultural Practices—Management techniques used to modify, manage and replace a forest over time. Silvicultural practices are classified according to the method of carrying out the process (Shelterwood, Seed Tree, clearcut, commercial thinning, etc.).

Silviculture—The art, science and practice of controlling the establishment, composition, structure and growth of trees and other vegetation in forest stands.
Site Index—A measure of a forest areas relative productive capacity for tree growth. Measurement of site index is based on height of dominant trees in a stand at a given age.
Succession—A series of dynamic changes by which one group of organisms succeeds another through stages leading to a potential natural community or climax. The process of plant community development after disturbance involves changes in species composition over time.
Suitable Forest Land—Commercial forest land identified as having the biological capability to sustain long-term timber production (that has not been withdrawn from timber production).
Uneven-Aged Management—The application of management techniques which will maintain high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes. Cutting methods that develop and maintain uneven-aged stands are single-tree and group selection.
Volume Class—Classification system used to differentiate timber stands into similar average volume per acre categories or strata.

Environmental Consequences

This section describes the potential direct and indirect effects of timber harvest to the timber and vegetation resources from implementation of an action alternative. Timber harvest activities on the Tongass National Forest are strictly governed by Federal and state law, and Forest Plan standards and guidelines designed to minimize detrimental effects to other resources.

Direct Effects

Direct environmental effects are those occurring at the same time and place as the result of the implementation of one of the timber harvest action alternatives.

Forest Plant Communities

Timber harvest activities will influence forested plant communities, but will have little affect on non-forested plant communities. The only exception would be road segments that cross non-forested cover types. Timber harvest activities will convert the plant community seral stage of forest stands into earlier successional stages. Although timber harvest will change the current seral stage, harvesting does not change the potential climax community that can be achieved on a particular site. Because climax communities are based on climate, geology, and soils of the area, the effect of unit harvest upon the existing plant association series will be negligible. The exception to this is the removal of land area from productivity for the reasonably foreseeable future due to road construction activities.

Non-forested Cover Types

Timber harvest may affect the non-forested vegetation communities because of road building activities that cross these communities. GIS mapping also identified some non-forested cover types within some units, although field verification activities identified the areas as at least partially forested. Alder shrublands, alpine vegetation, and rock, located at upper elevations and/or the edge of the merchantable timberline, should not be significantly affected. The shrubland community type occurs across several slopes where road building will take place. The muskeg community type borders many of the units in the Project Area and also exists in large areas between units.

Threatened and Endangered Plant Species

Effects on threatened, endangered, and sensitive plant species are discussed in the *Threatened, Endangered, and Sensitive Species* section of Chapter 4.

Volume Strata

The number of acres proposed for harvest within each volume stratum is shown in Table 4-9 for each alternative. No harvest is proposed within the Project Area for Alternative 1. The maximum harvest would be less than 5 percent of each volume stratum under Alternative 12.

Table 4-9
Proposed Harvest Acreage by Volume Stratum and Alternative

Volume Stratum	Project Area Acreage[1/] Under Existing Conditions	Acreage of Harvest Alt. 10	Alt. 11	Alt. 12	Alt. 13
Low Volume	17,829	254	577	799	535
Medium Volume	27,400	337	1,031	1,282	945
High Volume	30,803	243	998	1,247	764
Other[2/]		130	374	441	333
Total	76,032	964	2,980	3,769	2,577

1/ Includes nonencumbered National Forest System lands in the Project Area only.
2/ Inclusions of nonproductive forest and non-forest plus areas not mapped as productive forests, but ground-verified as such.

Forest floor vegetation

Site Class

In general, low site class lands produce lower volumes per acre over a given time period than high site class lands. It is generally more economically feasible to harvest the sites with the higher productivity rating. However, other factors are considered when establishing harvesting priorities, so harvest units are generally distributed across a range of productivity classes.

Estimates of site productivity (site index) in southeast Alaska old growth stands can be best obtained from examination of the soil. Soil-site relationships have been developed, as a measure of site class, based primarily upon depth and drainage of soil and parent material (Ruth and Harris, 1979).

In all action alternatives, the majority of the harvest is proposed to come from the sites of medium and high productivity. Most of the areas mapped as a very low site index within the units have been field verified as productive timberland, containing greater than 8,000 board feet per acre. However, there are some inclusions of unproductive land within the harvest units that would be classified as very low site class.

Proposed Harvest Volume

Table 4-10 provides an estimate of the total volume expected to be harvested for Alternatives 10, 11, 12, and 13. The volume has been adjusted for the various silvicultural systems described in Chapter 3. Table 4-10 also includes estimated volumes associated with road clearing.

Table 4-10
Proposed Harvest Volume by Alternative

	Total Volume (MBF)				
	Alt. 1	**Alt. 10**	**Alt. 11**	**Alt. 12**	**Alt. 13**
Unit Volume	0	24,141	67,418	81,072	57,646
Road Volume	0	1,500	3,750	4,500	3,000
Total Volume	0	25,641	71,168	85,572	60,646

Proposed Harvest by Silvicultural System

The existing successional stage will be altered by the proposed silvicultural treatments. Even-aged silvicultural cutting practices will result in the conversion of mature and overmature stands to seedling stands with various levels of older age residuals. This process will occur on all sites except those that are proposed for uneven-aged management or overstory removal. Overstory removals will result in conversion of the existing stand to an immature stand with various levels of older age residuals. The post-harvest successional stage, for all harvest types and particularly uneven-aged treatments, will be dependent upon the plant community, the retained canopy structure (harvest design), and advance regeneration.

Species composition will change from an existing condition to a managed condition. Future condition on some sites is expected to consist of a lower composition of cedar. Studies indicate that other conifer species can out compete the cedars on sites which are most preferred by cedar (Forest Health Management Report, USDA Forest Service, 1992). Other sites may produce higher amounts of understory vegetation which can also affect species composition, seedling survival, and growth.

Table 4-11 summarizes the use of Project Area silvicultural systems for Alternatives 10, 11, 12, and 13. Shown along with the total number of acres in the alternative. Levels of snag and green tree reserves for individual units are included in the unit prescription and indicated on the unit cards located in Appendix D.

Table 4-11
Proposed Harvest by Silvicultural System and Alternative

	Alt. 1 Acres	Alt. 10 Acres	Alt. 11 Acres	Alt. 12 Acres	Alt. 13 Acres
Clearcut w/ Reserves	0	325	632	687	622
Non-clearcut Regen.	0	631	2,052	2,605	1,614
Uneven-aged Mgmt.	0	8	296	477	341
Total[2/]	0	964	2,980	3,769	2,577

Clearcutting as the Optimal Method of Harvesting

The Alaska Regional Guide established silvicultural and management standards for the western hemlock-Sitka spruce forest type (Alaska Regional Guide, Page 3-18). Even-aged management in the form of clearcutting is, according to the Regional Guide, to be used where (1) the management objective is to meet timber production objectives established in the Forest Plan, (2) where there is a risk of dwarf mistletoe infestation, and (3) where risk of windthrow is determined to be high. Harvest units in the unit pool are within Timber Production, Modified Landscape, and Scenic Viewshed LUDs and have a moderate to high risk of windthrow. Approximately 18 percent of the units in the unit pool are prescribed for clearcut harvest with reserve trees. Clearcutting of these harvest units will meet the objective of maintaining fast-growing, mistletoe-free stands of mixed species and is the optimum method of harvesting, considering the following factors referenced in the Alaska Regional Guide:

1. The thin bark and shallow roots of hemlock and spruce make them particularly susceptible to logging injury, which leads to decay. Losses from decay fungi are high, especially in the old-growth forests of Alaska. Conversion from old- to young-growth by clearcutting has the greatest potential for reducing decay.

2. Hemlock dwarf mistletoe, *Arcenthobium tsugense*, a common disease of western hemlock, can be best controlled by clearcutting. Elimination of residual overstory trees infected with dwarf mistletoe prevents infestation of western hemlock in the new stand.

3. Exposure to the sun raises soil temperature, which speeds decomposition, thereby improving the productivity of most sites.

4. Clearcutting favors regeneration of Sitka spruce by destroying advance hemlock regeneration and by creating more favorable conditions for post-logging reproduction of spruce.

5. Risk of blowdown in residual stands is eliminated. The chance of blowdown along cutting boundaries is increased but can be reduced through proper design of cutting units.

6. Natural seed fall is generally adequate for regeneration and most young stands are dense.

7. Logging costs are lower than with other systems.

Proposed Harvest Methods

The harvest methods proposed for the action alternatives were selected from systems available and in use in or near the Project Area. The systems were selected on a setting basis after site visits and critical profile analyses were performed to determine the most efficient system while still meeting Forest standards and guidelines. The majority of the settings proposed for harvest are designed to achieve at least partial suspension of the logs while yarding. Therefore, there is a significantly higher percentage of skyline systems than historically has been used in the Project Area. This is due to the increased stream and soil protection which these systems allow, and is required by TLMP.

Shovel logging is being used more frequently in the Project Area due to its efficiency. Limited shovel logging is proposed; however, there may be more opportunities to use this system than shown. Small portions of cable settings potentially could be suited to shovel logging. This determination would occur during the final layout.

Helicopter logging is specified in each alternative. This system was only selected on settings where conventional logging systems were not feasible. None of the helicopter settings have any additional road construction associated with them over what is existing or specified for the conventional harvested settings. However, several of these units depend on other units being harvested for developing adequate landings.

Table 4-12 displays the distribution of proposed yarding systems for the action alternatives. Running skyline, live skyline, slackline, highlead, and shovel yarding are combined into the conventional yarding systems in the table.

Table 4-12
Distribution of Proposed Harvest Systems by Alternative

	Alt. 10		Alt. 11		Alt. 12		Alt. 13	
Harvest System	Acres	%	Acres	%	Acres	%	Acres	%
Conventional	681	71	1,986	67	2,583	69	1,672	65
Helicopter	283	29	994	34	1,186	31	905	35
Totals	964	100	2,980	100	3,769	100	2,577	100

Proposed Harvest Unit Size

The NFMA limits the size of a forest opening that may be created based on the forest type. For the coastal Alaska western hemlock/Sitka spruce forest type, the maximum created opening size allowed is 100 acres. No harvest units will result in opening greater than 100 acres.

Successional Stages and Associated Stand Management

Following harvest, the managed forest will go through distinctive successional stages. Removal of the forest overstory alters the microsite conditions that influence density and species composition of the understory vegetation. Different components dominate the stand at different stages, and the overall forest structure will change as the new stand develops. The level of change will depend on the type of silvicultural treatment applied during harvest and subsequent treatments applied during stand development. Characteristics such as tree height, diameter, and overall stand productivity will vary according to site class. However, second-growth stands commonly show less variability in tree diameter and height than the old-growth stands they are replacing. Various levels of large tree structure will be retained in all harvested stands for diversity and wildlife habitat.

Forest Health

Timber harvesting within the Control Lake Project Area will result in the reduction of the number of stands with slow or declining growth rates due to decay and western hemlock mistletoe. Harvesting stands in declining health and replacing them with young vigorous stands will reduce the volume loss associated with decays and increase the growth and yield of the managed forestland across all action alternatives. From the perspective of timber management, the health of the timber stands is increased through harvesting. However, many insects and pathogens also contribute significantly to ecosystem diversity and long-term stability in old-growth stands by providing increased canopy diversity and animal habitat in the form of snags and small openings.

Harvest of the proposed unit pool will have no measurable effect upon the overall forest pest populations. Although partial cutting activities may benefit stand health in the form of stocking control, it could be negated through basal damage if preventive care is not taken during logging operations.

Windthrow

There will be an increased possibility that more windthrow will occur throughout the Project Area as harvest levels increase and exposed stand edges are created. Stands that are less susceptible to windthrow have developed with an open canopy structure that allowed individual trees to become windfirm in response to wind stress. Even-aged silvicultural practices increase the likelihood of blowdown by increasing the amount of previously unexposed standing timber exposed to the winds.

Since windthrow is a stochastic event, its occurrence, placement, and timing across the landscape is not completely predictable. However, localized conditions (soil, hydrological, or topographical) were considered to predict potential windthrow within and adjacent to proposed harvest units. Units were designed in the field with considerations for windthrow, and boundaries and buffers were adjusted to mitigate these effects.

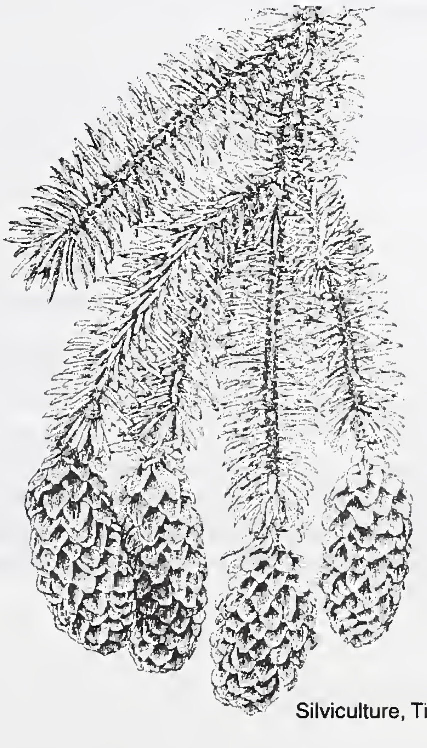
The strongest winds come from the southwest and southeast; therefore, windthrow is most likely to occur in mature stands with uniform and dense crown structures along the north edge of clearcut units. Partial cutting techniques which remove less than 30 percent of the overstory are more wind resistant than other silvicultural practices (Harris, 1989). However, if the basal area removed exceeds 30 percent, partially cut stands may also suffer wind damage. This project has incorporated much of the information that is available to design units in a way to minimize the potential for windthrow after harvest.

Reforestation

Natural regeneration is still used to restock most units harvested; however, hand-planting of Alaska yellowcedar is practiced where the yellowcedar component is desired, but would have a low likelihood of survival with natural regeneration methods. Cedar silviculture is challenging, and to be successful it requires a variety of techniques. The autecology of cedars suggest that partial cutting may be more useful in maintaining cedars as a viable timber resource (USDA Forest Service, 1992).

Precommercial Thinning

Natural regeneration often results in overstocked stands. Precommercial thinning (PCT) is designed to improve future growth by reducing stand density, thus also reducing the competition between trees for sunlight, moisture, and nutrients. Thinning also promotes development of target species composition. For example, cedars can be found as leave trees to enhance their proportion of stand composition. The method for thinning any particular stand is based on the characteristics of the site and the objective of moving the stand toward the desired future condition. Thinning is classified as precommercial when there is no commercial wood utilization.



This treatment would need to be performed on stands approximately 15 to 25 years following harvest. The highest priority for thinning would be given to the stands with the highest average site index. Thinning guidelines designed to meet timber production goals generally target trees based on genetic and structural dominance. The spacing guidelines for PCT timber production objectives varies by site index, with the widest spacing on the highest site class lands.

Cumulative Effects

Cumulative effects are those that result from the incremental effect of the action when added to the past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. This section summarizes the impacts of the Control Lake proposed harvest upon the environment in combination with the effects of past and proposed future actions.

Past Harvest

The earliest commercial timber harvest on central Prince of Wales Island was limited to easily accessible coastal shorelines. Development of the logging road system marked the beginning of intensive land-based efforts. Table 4-13 displays the area logged since 1940 and includes harvest to the full implementation of the 1989-1994 EIS.

Table 4-13
Acres of Previous Timber Harvest

Harvest Period	Acres Harvested
1940 to 1949	20
1950 to 1959	40
1960 to 1964	30
1965 to 1969	2,337
1970 to 1974	25
1975 to 1979	187
1980 to 1984	244
1985 to 1989	3,115
1990 to 1994	4,605
Total	10,603

Source: GIS query, USDA Forest Service, TNF

Projected Harvest Through 2007

The 1997 TLMP Revision suitable forest land base is approximately 26,545 acres. About 22,786 acres of this area is in old growth. The Ketchikan Area 10-year sale program does not project a second entry into the Control Lake Project Area before 2007. The proposed harvest under Alternative 12 approximates the maximum harvest volume for the planning period. Any units that are not harvested under the selected action alternative may potentially be selected during another entry for harvest.

Cumulative Harvest Through 2057

The predicted effect of harvest on the Control Lake Project Area and future timber harvest activities on central Prince of Wales Island is to move toward the desired future condition for each LUD as described in the Forest Plan Revision. Areas that allow timber harvest will result in the conversion of a large percentage of mature forests to early successional stages on suitable forest lands.

Table 4-14 shows the average annual past and proposed timber harvest from 1940 through 2057. A maximum harvest alternative (Alternative 12) for Control Lake has been substituted for the Forest Plan acres for the 1998 to 2007 period to represent the acres that have been field verified for harvest.

Table 4-14
Average Annual Timber Harvest Acres from 1940 through 2057

	Average Annual Harvest Acres
Pre-harvest Condition (pre-1940)	0
Past Harvest (1940 to 1997)	183
Proposed Harvest (1998 to 2007)	377
TLMP (2005 to 2057)	367

Timber Supply

Approximately 22,786 acres of old growth remain in the suitable forest land base of the Project Area, which would be harvested between now and the year 2057. This includes the acreage to be harvested under the Control Lake Sale, which varies under the action alternatives from 964 acres (Alternative 10) to 3,769 acres (Alternative 12). It is estimated, based on TLMP 1997 numbers updated for current land ownership, that harvest could occur at the rate of approximately 367 acres per year. The 367 acres could approximate 35 to 75 MMBF/decade depending on site-specific resource concerns. For example, areas of suitable timber lands with higher stream densities that needed buffers would yield volumes in the lower part of the range. Similarly, the amount of non-clearcut treatments will affect the overall yield. The 35 to 75 range is a judgement based on recent experience and more intensive field investigations. The projected harvest reflects the Control Lake Project Area's estimated contribution to an average Annual Sale Quantity (ASQ) of approximately 267 MMBF for the Tongass National Forest (TLMP, 1997).

Since 1979, additional land use interests and resource information have influenced Forest Service management direction. Road building associated with timber harvest has led to increased levels of State selection of land for residential communities, removing these lands from the National Forest System. Increased access has also led to increased demand for recreational opportunities, including both developed and undeveloped settings. Increased knowledge of the effects of management activities has led to changes in standards and guidelines and BMPs in order to protect valuable fisheries, wildlife and forest resources. The actual rate and acres of future harvest are expected to vary from the estimate provided above due to the additional multiple use demands on, and increased natural resource knowledge of, the Forest System land base.

Mitigation

Mitigation of proposed timber harvest activities began with the resource surveys and unit design field work conducted during the summer of 1993.

The mitigation of proposed timber harvest activities includes the design of alternative harvesting strategies, adjustment to unit boundary layout, and placing limitations on harvest scheduling where other resource concerns were identified. Buffers have been placed along streams and lakes in accordance with the Forest Plan standards and guidelines. Prevention and mitigation of blowdown was developed using techniques described in the Southeast Alaska Guide for Reducing Wind Damage (Harris, 1989). The applied techniques use unit design and harvest prescriptions, which incorporate reserve trees within the unit, to reduce risk.

The following silvicultural practices have also been implemented to mitigate the effects of timber harvest. Partial cutting, in the form of Seed Tree; Shelterwood; and group selection harvest, are used to enhance stocking, relative vigor, and species composition where it is appropriate In some units, the silvicultural prescriptions require that cedar be retained within the unit or along unit boundaries. This is expected to improve the potential for increasing the cedar regeneration within the units where it may be out competed by other species. In order to maintain the high abundance of Alaska yellowcedar, reserve trees are often prescribed to provide seed and shelter for yellowcedar regeneration. Harvest units where this measure would apply currently sustain moderate to high levels of Alaska yellowcedar and have plant associations that favor Alaska yellowcedar growth. Units that incorporate specific mitigation measures are identified on the unit cards and in the silvicultural prescriptions.

Monitoring

Project-specific monitoring is recommended as an ecosystem management measure to monitor the implementation and effectiveness of different types of clearcutting with reserve trees, and various types of partial cutting and uneven-aged management techniques prescribed for the Control Lake Project Area units. Monitoring should determine the degree that reserve tree blowdown occurs and how this blowdown is affected by site factors. Monitoring should also examine regeneration and stand development following each harvest type. Implementation and effectiveness of timber standards and guidelines will be monitored as part of the Forest Plan monitoring report.

Wildlife

Key Terms

Habitat—the sum total of environmental conditions of a specific place that is occupied by an organism, population, or community of plants or animals.

Habitat capability—an estimated number of animals that a habitat can sustain.

Management Indicator Species (MIS)—species of vertebrates and invertebrates whose population changes are believed to best indicate the effects of land management activities.

Viable population—the number of individuals of a species required to ensure the continued long-term existence of the population in natural, self-sustaining populations, well distributed throughout their range in the national forest.

Wildlife Analysis Area (WAA)—division of land identified by the Alaska Department of Fish and Game (ADF&G) and used by the Forest Service for wildlife analysis.

This analysis considers the direct, indirect, and cumulative effects of the alternatives proposed for the Control Lake Project. Effects are projected to 2007, the anticipated end of the proposed action and to 2095 to show the cumulative effects of ongoing Forest Plan implementation.

Wildlife Habitats

Wildlife species are individually adapted to combinations of plant community types and successional stages. Changes in plant communities or successional stages may result in changes in animal communities. Generally, the more diverse the vegetation, the greater the abundance and variety of wildlife species in an area. The probability of maintaining viable populations increases if suitable habitat is present in sufficient types, amounts, and spatial arrangements on a landscape level. Changes in forest cover types or successional stages occur as a result of natural and human caused disturbance. Timber harvest may add to, or detract from, the diversity of an area depending on existing conditions and the type and amount of harvest planned.

The effects of the proposed alternatives differ for various groups of wildlife in relation to their habitat requirements, feeding habits, and interaction with humans. Wildlife species used to gauge the impact of proposed alternatives include MIS and Threatened, Endangered, and Sensitive species that are potential inhabitants of the area.

Timber harvest and road construction are the principal activities likely to generate direct, indirect, and cumulative effects on wildlife in the Control Lake Project Area. Effects on wildlife from trapping, hunting, and recreational activities are indirectly tied to the type and magnitude of timber harvest. Timber harvest and road construction have the potential to affect wildlife resources through (1) habitat alteration, (2) disturbance from project activities, and (3) increased post-harvest human access. Greater public access in turn increases the vulnerability of game animals to hunting and of furbearers to trapping, and may cause shifts in species traditional use patterns.

Proposed harvest acreage by volume stratum is presented for each alternative in Table 4-9. The alternatives propose to harvest from 964 acres under Alternative 10 to 3,769 acres under Alternative 12. These acres are mostly made up of mapped productive old growth, which ranges from 834 acres under Alternative 10 to 3,328 acres under Alternative 12. This represents a harvest of 1.1 to 4.4 percent of the existing productive old growth in the Project Area. Alternatives 11 and 13 would harvest 3.4 percent and 3.0 percent of the existing productive old growth in the Project Area, respectively.

Harvest of high-volume old growth would range from 243 acres under Alternative 10 to 1,247 acres under Alternative 12. This represents a harvest of 0.8 to 4.0 percent of the existing high volume old growth in the Project Area. Alternatives 11 and 13 would harvest 3.2 percent and 2.5 percent of the existing high volume old growth in the Project Area, respectively.

Table 4-15 presents the percentage of total acres harvested by silvicultural treatment (see *Silviculture, Timber, and Vegetation* section in Chapter 3). Clearcuts with reserves would retain trees of various sizes along the edges of yarding settings. Minimal canopy cover of the residual stand would be retained. Lines of trees along the edge and or within the harvest unit would provide some larger tree structure within the new regenerated stand. Alternatives include 18 to 34 percent clearcut with reserve harvests.

Non-clearcut regeneration harvests would leave patches of uncut trees within the unit and various densities and sizes of individual trees throughout the unit. Canopy closure within the planned harvest unit would generally be 10 to 50 percent after harvest. Trees and patches of uncut trees are expected to add significant structural diversity to the regenerated stands. Alternatives include 63 to 69 percent non-clearcut regeneration harvests.

Uneven-aged management units will generally retain greater than 50 percent of the original harvest unit canopy closure and most often greater than 70 percent. The harvested stand should still function similar to the original stand. Alternatives include 1 to 13 percent uneven-aged harvests.

Table 4-15
Proposed Silvicultural Treatments

	Estimated % Canopy Cover Retained	% of Acres Proposed for Harvest			
Harvest Type		**Alt. 10**	**Alt. 11**	**Alt. 12**	**Alt. 13**
Clearcut w/ Reserves	2-10	34	21	18	24
Non-clearcut Regen.	10-50	65	69	69	63
Uneven-aged Mgmt.	50-70	1	10	13	13

Additional old-growth habitat would be cleared for construction of roads proposed under the action alternatives. Alternative 12 would harvest the most old growth for roads, while Alternative 10 would harvest the least. As described in the *Transportation and Facilities* section of Chapter 4, these roads would provide access for future harvest entries; therefore regeneration of old-growth characteristics would not occur.

Site-specific information has been used to design harvest units which ensure implementation of legislated protective measures, Forest-wide standards and guidelines, BMPs, and unit-specific mitigative measures. Through this process, adverse effects to remaining acreages of specific wildlife habitats are reduced or eliminated.

Beach Fringe and Estuary

No harvest is planned within the 1,000-foot Beach and Estuary Fringe based on Forest Plan Standards and Guidelines. There would also be no construction of roads through these areas.

Riparian Management Areas

Riparian habitat was identified by the boundaries of the Riparian Management Area, as defined in the Riparian LUD. No harvest is planned within these areas. However, limited road construction would occur in some RMAs. See the *Wetlands, Floodplains, and Riparian Areas* section of this chapter.

Road Density

Increased human access could intensify harvest of marten, black bear, Sitka black-tailed deer, and Alexander Archipelago wolf through increased hunting and trapping pressure. Because the Project Area is accessible from communities on Prince of Wales Island via the road system, and from other Southeast Alaska communities via the Alaska Marine Highway System, a road access management plan was developed. This plan is designed to mitigate the potential effects of increased hunting and trapping pressure. Closures were proposed on a road-by-road basis depending on resource values, silvicultural needs, public input, and other management activities. Table 4-16 displays the current road densities for the Project Area and the road density with closures under the action alternatives.

Table 4-16
Road Density by Alternative

Alternative	WAA	Road Density	Open Road Density After Closures
Alt. 1	1318	0.78	0.78
(Current)	1319	0.91	0.63
	1323	0.23	0.23
	1421	0.39	0.39
	Project Area	0.68	0.57
Alt. 10	1318	0.87	0.60
	1319	1.00	0.48
	1323	0.23	0.10
	1421	0.39	0.23
	Project Area	0.72	0.40
Alt. 11	1318	0.99	0.60
	1319	1.11	0.49
	1323	0.40	0.10
	1421	0.49	0.23
	Project Area	0.85	0.41
Alt. 12	1318	1.00	0.61
	1319	1.19	0.57
	1323	0.48	0.19
	1421	0.58	0.32
	Project Area	0.91	0.47
Alt. 13	1318	1.00	0.61
	1319	1.06	0.49
	1323	0.24	0.10
	1421	0.49	0.23
	Project Area	0.80	0.41

*No Action Alternative does not include implementation of Road Access Management Plan.

Management Indicator Species

Table 4-17 includes results of model runs for the Final EIS. The deer and marten habitat capabilities are produced using the 1997 TLMP models. Each MIS is discussed in more detail in the following pages.

Table 4-17
Changes in Habitat Capability for Deer and Marten by Alternative

Species	% of 1997 Habitat Capability Alt. 1	Alt. 10	Alt. 11	Alt. 12	Alt. 13
Black-Tailed Deer (0-25 yrs after harvest)	100.0	99.9	99.3	99.1	99.5
Black-Tailed Deer (25-100 yrs after harvest)	100.0	99.6	98.2	97.5	98.7
Marten (0-25 yrs after harvest)	100.0	99.5	98.3	97.9	98.6
Marten (25-100 yrs after harvest)	100.0	99.4	98.0	97.5	98.4

Sitka Black-tailed Deer

During severe winters Sitka black-tailed deer are dependent on low elevation, high volume, old-growth stands. Typically, the long-term quality of deer winter range is reduced by timber harvest. Clearcuts and second growth provide little snow interception above forage and, therefore, greatly increase effects of snow. Even in unlogged conditions, a deep-snow winter can kill many deer.

The deer model indicates that, for the first 25 years after harvest, habitat capability would decline from 0.1 percent in Alternative 10 to 0.9 percent in Alternative 12 from the existing condition. After the harvest areas regenerate and become young second-growth forests, 25 to 100 years after harvesting, habitat capability would decline from 0.4 percent to 2.5 percent, according to the model. These percent declines are conservatively large because all harvest areas are treated in the model as if they were clearcut.

Under the action alternatives, between 18 (Alternative 10) and 358 acres (Alternative 12) of high quality deer habitat would be harvested (Table 4-37). Alternative 11 would result in the harvest of 222 acres of high quality winter range and Alternative 13 would harvest 95 acres.

The units with the highest deer winter range value that remain in the unit pool include units 596-409 and -416 in the Rio Roberts watershed and units 593-408, -409, -420, -422, and -424 in the Elevenmile area. All seven of these units are in Alternative 12, four are in Alternative 11, and none of them are in Alternatives 10 or 13.

Road density within the Project Area would increase from the current level of 0.68 to between 0.72 and 0.91 miles per square mile, depending on the alternative selected (Table 4-16). Increased road densities may increase hunter success with improved access. Although no specific recommendations exist for Southeast Alaska, black-tailed deer models developed in Washington indicate that open road densities should be maintained below 2.5 miles per square mile to maintain habitat capability (Washington Department of Wildlife, 1987). Depending on the alternative selected, between 18 (Alternative 10) and 54 (Alternative 12) miles of newly constructed roads and 51 miles of existing roads are proposed for closure following completion of harvest activities (about 34 miles are already closed). This would result in lower post-harvest open road densities than under existing conditions. The post-harvest open road density would range from 0.40 to 0.47 miles per square mile within the Project Area depending on the alternative (Table 4-16).

Black Bear

As noted in Chapter 3, preferred habitats for black bear include coastal, estuarine, and riparian areas. Chapter 3 also notes that bears use openings for foraging, but when openings are large, less use is expected.

TLMP (1997) standards and guidelines and LUDs allow no programmed timber harvest within 1,000 feet of the beach and estuaries or within riparian management areas along Class I, II, and III streams. All Control Lake harvest units comply with this direction. Alternatives to clearcut harvest methods will provide adequate escape cover in many treated areas.

Road density within the Project Area would increase from 0.68 to between 0.72 and 0.91 miles per square mile for the duration of harvest activities (Table 4-16). As described in the Subsistence section, additional road access could affect black bear populations by increasing hunter success (Kolenosky and Strathearn, 1987). However, after closures, open road densities would drop to between 0.40 and 0.47 miles per square mile, which would be less than the existing open road density.

Based on the additional habitat protection provided in the new TLMP (1997), alternatives to clearcut harvest methods used, and implementation of the road access management strategy, no significant effects are anticipated on black bears.

Gray Wolf

Because of the high degree of dependence on deer as prey, wolf populations are expected to be affected in proportion to the effect on deer populations. Therefore, wolf habitat capability would decline from 0.1 to 0.4 percent in Alternative 10 to 0.9 to 2.5 percent in Alternative 12 relative to existing conditions.

Concerns and considerations regarding the wolf on the Tongass, including viability concerns, are addressed on pages 3-399 to 3-406 and Appendix N of the TLMP (1997) Final EIS. These are incorporated by reference.

The TLMP Revision (1997) recommends that open road densities of 0.7 to 1.0 mile per square mile or less be targeted in areas where road access has been determined to significantly contribute to wolf mortality. Although implementation of an action alternative would increase road density within Project Area WAAs, post-harvest road closures are proposed to maintain road densities below 0.7 mile per square mile. Depending on the alternative selected, overall open road densities would range from 0.40 to 0.47 mile per square mile after closure.

Several units proposed for harvest under Alternative 12 are of concern relative to the core use area of the Honker Divide pack (D. Person, personal communication). These include units 577-443 and 577-426, -431, and -432. All of these units are included in Alternative 12, two are in Alternatives 11 and 13, and none are in Alternative 10.

Marten

Marten are easily trapped and are prone to overharvest, especially when trapping pressure is high. An increase in road density, particularly when located through marten travel corridors and foraging areas, would increase human access and the risk of trapping mortality. The access management plan is designed to reduce exposure of wildlife populations to increased hunting and trapping resulting from increased road densities.

Based on the marten model, habitat capability is expected to decline from 0.4 to 0.5 percent under Alternative 10 to 2.1 to 2.5 percent under Alternative 12. Alternatives 11 and 13 would be intermediate in their effects (Table 4-17).

As noted in Chapter 3, *Affected Environment*, the TLMP Revision (1997) includes a Forest-wide program to conserve and provide habitat to assist in maintaining long-term sustainable marten populations. The new standards and guidelines include special features for protection of high quality marten habitat in higher risk biogeographic provinces. These standards and guidelines specifically apply to VCU 597.2 in this Project Area. To meet the TLMP Transition Category 3 requirements, modifications were made to these units to maintain high value marten habitats. Units 597.2-417, 418, 421, 414, and 437 were modified in total to selective harvest. Units 597.2-428, 459, and 460 had portions modified to selective harvest. Units 597.2-449 and 450 were dropped. In addition, alternatives to clearcutting will contribute toward short-term and long-term maintenance of habitat characteristics for marten. The alternatives to clearcutting meet or exceed the standards and guidelines for marten in other project VCUs.

River Otter

The river otter's primary habitat is in old-growth stands located near the coast and larger lakes and streams of the Project Area. No units occur within high quality river otter habitat; therefore, all action alternatives maintain current habitat capability.

Bald Eagle

The potential effect of the Control Lake Project on bald eagles would be limited to disturbance to nesting eagles from proposed logging operations. The extent of these impacts would vary depending on: (1) the amount of timber harvest activity occurring in the vicinity of eagle habitat under each alternative; (2) type of logging operation; (3) amount of screening cover within the vicinity of nest sites; and (4) timing of logging operations relative to eagle nesting.

Scheduling development activities away from beach fringe, estuaries, lake buffers, and Class I and II streams would effectively avoid impacts to bald eagle habitat. Management activities within 330 feet of an eagle nest site are restricted by an Interagency Agreement between the Forest Service and the USFWS (USDA Forest Service and USDI Fish and Wildlife Service, 1990). Additionally, timing restrictions have been established for controlled blasting and helicopter logging that may occur within one-half mile of an eagle nest site (Table 4-18).

Twelve bald eagle nest buffers are located within one-half mile of 11 harvest units. Three nests located adjacent to proposed harvest units were flagged and distance to unit boundary measured to ensure maintenance of buffer zones. This included modifying the boundary of unit 593-408 to exclude the 330-foot buffer around an eagle nest that was originally located within the unit. Implementation of timing restrictions and buffers would mitigate effects on bald eagles.

Vancouver Canada Goose

The high quality nesting and brood-rearing habitat of Vancouver Canada geese is generally on the edges of forested areas near wetlands, lakes, streams, beaches, and estuaries. Waterfowl standards and guidelines in the Forest Plan together with the protection of beach fringe, estuaries, and riparian areas, and the marginal timber found in high quality goose habitat are expected to result in minimal project effects on the Vancouver Canada goose. Road density within the Project Area would increase with implementation of any of the action alternatives. Vancouver Canada geese reportedly avoid habitat located within 660 feet of an open road. Planned road closures after completion of the harvest activities would minimize the effects on Vancouver Canada geese.

Table 4-18
Road Construction Affected by Seasonal Blasting Restrictions

Road Number	Associated Unit(s)
71-79-34.2 (#2051)	593-408
72-79-34F (#2051)	593-408

Red-breasted Sapsucker, Hairy Woodpecker, and Brown Creeper

Habitats for these species are conserved by applying the Reserve Tree/Cavity-nesting Habitat standards and guidelines of the Revised TLMP (1997). The clearcut with reserves and the alternatives to clearcutting used extensively in the Control Lake harvest prescriptions also contribute to two-age stands for the future. Brown creeper habitats would decline under the action alternatives in proportion to the decline in high volume old growth (Table 4-9).

Cumulative Effects

Cumulative effects are the result of accumulated land management activities. Assessed individually, the disturbances caused by a particular action may appear to have only a minor effect, but if a multitude of actions are assessed collectively through time, their cumulative effects may result in a greater ecological disturbance.

The assessment of cumulative effects in the Control Lake Project Area and adjacent areas is based on past timber harvest and related activities and other foreseeable actions through implementation of the Forest Plan. For this analysis, Alternative 12, the unit pool under the TLMP Revision (1997) is used as the 2007 harvest condition. By design, Alternative 12 shows how much timber harvest could be made available within all Forest Plan standards and guidelines and LUDs. It represents one approach to unit configurations. If any of the other alternatives are selected, the difference between that alternative and Alternative 12 would represent potential harvest acreage opportunities available under the Forest Plan during approximately the next 10 years.

Many of the MIS, as well as the other species of concern, are covered by specific and general standards and guidelines in the Forest Plan (Chapter 4, Wildlife Forest-wide standards and guidelines). These are designed to reduce, minimize, or avoid adverse effects potentially occurring at the project level during forest plan implementation. The species-specific and other standards and guidelines can be relied upon to maintain some of the habitat features and other factors necessary for these species. The Forest Plan combines an overall forest-wide old-growth conservation strategy at a more general level, with reliance on standards and guidelines to address project-level effects. For most old-growth-associated species not specifically assessed in the Forest Plan, it can be assumed that, to the extent that functional and interconnected old-growth ecosystems are maintained, the various specific habitats within them important to these species will also be maintained.

The Control Lake project has been designed to be fully consistent with the new TLMP (1997). Looking beyond this project and projecting cumulative effects are best done by tiering to the Forest Plan ROD and Final EIS and incorporating by reference Appendix N of the Forest Plan.

Specifically, the Management Indicator Species section beginning on page 3-363 in the Forest Plan Final EIS, and the Sitka Black-tailed Deer section which begins on page 3-365 are most pertinent. Tables 3-110 through 3-112 in the Deer section include projections to 2095 for habitat capability, protected winter range, and densities by WAA. Note that Alternative 11 in the tables is the Forest Plan selected alternative (with modifications).

Appendix N provides additional evaluation of wildlife habitat conservation measures. Specifically, the old-growth habitat strategy, goshawk, marten, wolf, and other terrestrial mammals are most pertinent.

The anticipated continuation of road construction within the Control Lake Project Area and adjacent Central Prince of Wales and Polk Inlet areas would likely increase subsistence and non-subsistence hunting pressure in these areas. This effect can be controlled by adhering to the current management practice of closing dead-end local roads or roads accessing wildlife habitat management areas upon completion of future harvest entries.

The task of maintaining habitats to support viable populations has been approached through several evolving strategies. The *Biodiversity* section describes the strategy being implemented under the new Forest Plan. The TLMP Revision (1997) addresses the issues of biodiversity and viable populations on the Forest-wide level. The new Forest Plan strategies have been incorporated into the Control Lake alternatives.

Mitigation

Wildlife mitigation measures were developed for the Project Area based on: (1) application of forest-wide Standards and Guidelines; (2) results of studies on wildlife enhancement projects on Prince of Wales Island (DellaSala et al., 1993); (3) results of field visits by Project team biologists; and (4) ongoing observations in the Project Area. The Project team was able to locate specific areas where mitigation measures would be most effective; these areas should be emphasized during sale layout. The following measures were designed to eliminate or affect timing of harvest in valuable habitats (Landscape Level Mitigation); to increase structural diversity for wildlife within harvest units (Stand Level Mitigation); and to protect wildlife from direct and indirect effects of road construction, harvest operations or human access (Protection Measures). Site-specific mitigation measures are identified by harvest unit in Appendix C and on the unit cards in Appendix D.

Landscape Level Mitigation

Forest management goals for wildlife direct that as much contiguous old-growth habitat as possible be maintained to ensure the maintenance of viable populations. Additionally, adverse impacts from human activities should be minimized through road and facility management. Under the guidelines of this directive, specific geographic areas were deferred from timber harvest under some alternatives. These areas were selected for various combinations of reasons, all of which provide benefits to MIS and the complex of old-growth obligate and associate species they represent. Chapter 2 has a detailed description of alternatives.

The TLMP Revision (1997) incorporates new land use designations for the protection of old growth forest. These old-growth reserves, and their connecting corridors, will provide long-term maintenance of large old-growth blocks on the landscape level. In addition, new Standards and Guidelines for protection of wildlife species have been adopted. These have been incorporated into the Control Lake timber sales, as specified in the ROD for the TLMP Revision (1997).

Stand Level Mitigation

Stand diversity levels within harvest units could be enhanced through the application of specific silvicultural measures designed to provide structural diversity within regenerating stands. Measures include clearcutting with reserve trees or partial cutting. The primary objective of this mitigation strategy would be to provide habitat for species that use specific stand attributes characteristic of old-growth forest (e.g., large-diameter snags and structural diversity).

By including old-growth "islands" or reserve trees within harvest units and by partial cutting, within-stand diversity will be better maintained within regenerating units. Old-growth islands should reserve large-diameter snags and live trees. Snags could be distributed in clumps away from guylines and in protected draws to minimize blowdown effects and conflicts with safety standards (USDA Forest Service, 1993). Retaining live trees, as well as snags, ensures adequate snag recruitment throughout the length of the rotation, provides additional snow interception within regenerating units, provides greater structural diversity within the second-growth stand, and provides refugia for important understory species which can recolonize the second-growth stand when it is old enough. Leaving nonmerchantable trees and safe snags along the edges or throughout the harvest unit is a minimum recommendation identified for all harvest units as a means of maintaining snag densities and increasing structure in second-growth stands.

These efforts will help maintain local wildlife and plant populations that are dependent upon this component of wildlife habitat. Such species include cavity-nesters, insects, fungi, and small mammals and their predators. In addition, green-tree replacements and down woody material will be retained. The level of retention for each unit was determined with input by a wildlife biologist. Refer to the Project Unit Cards for more specific details. The exact location of snag and green-tree replacement zones within each harvest unit will be designated during layout or sale administration, and will be designed in such a fashion as to not impose undue safety hazards and to be compatible with the logging system.

All VCUs proposed for harvest in the Control Lake Sale meet the TLMP Revision (1997) Standards and Guidelines for protection of marten habitat.

In Southeast Alaska, precommercial thinning is the preferred silvicultural treatment in regenerated stands and also has been widely used to enhance young-growth habitat for wildlife. Since this technique results in uniform tree growth, it may not achieve the desired effect of enhancing diversity levels within regenerating stands. Consequently, the specific benefits to wildlife are the subject of recent debate and studies are currently underway to assess the effectiveness of this enhancement program (DellaSala et al., 1992). The proposed harvest types provide an opportunity to determine the effectiveness of different methods for maintaining structural diversity within regenerating units and their use by wildlife. Such techniques would require follow-up monitoring to determine their effectiveness and the need for further design modifications.

Protection Measures

The following additional mitigation measures (W7-W12; Chapter 2) are proposed to provide protection for wildlife from human disturbance both during and after harvest operations:

1. If a marbled murrelet nest is identified within the Project Area, a 30-acre, generally circular nest area surrounding the nest tree will be designated as no-harvest (Mitigation Measure W7).

2. If a bald eagle nest is identified within the Project Area, a 330-foot forested radius will be maintained surrounding the nest tree. Between March 1 and August 31, restrictions on controlled blasting would be implemented on all road construction proposed within a one-half mile radius of a bald eagle nest site and on all helicopter logging and/or flight paths within one-quarter mile of a nest. These restrictions would be lifted after June 1 if the nest is found to be unoccupied. All management activities will be consistent with the Interagency Bald Eagle Management Agreement unless a variance is granted from the USFWS (Mitigation Measure W8).

3. Most existing and proposed roads would be managed to discourage or prohibit motorized use following harvest activities to minimize human disturbance to wildlife (i.e. reduce road densities) and to limit entry into valuable wildlife areas. Road systems on which post-harvest use would be discouraged or prohibited for wildlife protection have been incorporated into the road access management strategy. For a more detailed presentation of access management, see the *Transportation and Facilities* section (Mitigation Measure W10).

4. The following design management activities to avoid abandonment of wolf dens have been incorporated (Mitigation Measure W12).

   a) Maintain a 1,200-foot forested buffer, where available, around known active wolf dens. Road construction within the buffer is discouraged, and alternative routes should be identified where feasible. No road construction is permitted within 600 feet of a den unless site-specific analysis indicates that local landform or other factors will alleviate potential adverse disturbance.

   b) If a den is monitored for two consecutive years and found to be inactive, buffers described in 'a' above, are no longer required. However, in the spring-time, prior to implementing on-the-ground management activities (timber harvest or road construction), check each known inactive den site to see if it has become active.

The Forest Service will inform the purchaser, contractor, and other persons in the area that peregrine falcons, bald eagles, or goshawks could be potentially present, and that they are protected by law. The Forest Service would also inform the purchaser, contractor, and other persons in the area about the proper procedures for reporting suspected sightings or sign of threatened, endangered or sensitive species.

Monitoring

A variety of Forest-wide monitoring activities are proposed in the TLMP Revision (1997) to verify that Standards and Guidelines affecting wildlife have been implemented and are effective. The Tongass prepares an annual monitoring report addressing the status of Forest Plan monitoring (see Chapter 2).

Threatened, Endangered, and Sensitive Species

Key Terms

Candidate—a species for which the USFWS or NMFS has on file sufficient information to support issuance of a proposed rule to list the species under the Endangered Species Act; none of these occur on the Tongass National Forest.

Endangered—a species in danger of extinction throughout all or a significant portion of its range.

Haul-out—area of large, smooth, exposed rocks used by seals and sea lions for resting and pupping.

Patch—an assemblage of similar vegetation - in this document the focus is on old-growth forests of greater than 8,000 board feet/acre, with only small inclusions of other habitats.

Sensitive—species (identified by the Regional Forester) whose population viability is of concern on National Forests within the region, and which may need special management to prevent their being placed on State and Federal threatened and endangered species lists.

Threatened—a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

This analysis of the environmental consequences of the action alternatives on threatened, endangered, and sensitive species considers the direct, indirect, and cumulative effects of timber harvest in the Project Area. Effects are projected to 2007, the end of the proposed action and the current Forest Plan, and to 2095 to show cumulative effects of ongoing Forest Plan implementation.

Plants

Glyceria leptostachya is the only Region 10 sensitive species known to occur in the Project Area. Because its typical habitats are swamps and stream and lake margins (and the one observation near Control Lake was along a stream) timber harvest and road construction activities will generally avoid preferred habitats. The documented occurrence of the species is not located within a proposed harvest unit.

No other Region 10 sensitive species are known to occur in the Project Area, and none were found during field surveys. Of those with potential to occur (see Table 3-31 in Chapter 3), all occupy habitats that are: wet, boggy, or open meadow areas; rocky slopes or cliff areas; or stream and lake margins. In general, most timber harvest and road construction activities will avoid these areas. Very wet areas and cliffs were generally excluded from harvest units and no-cut buffers were prescribed along all Class I, II, and III streams and lakes. Therefore, although undetected individuals could be affected, no significant effects are expected for any of the species.

Wildlife

Humpback Whale

Because the humpback whale is primarily affected by changes in the marine environment, the primary effects from timber management operations in the Project Area would be limited to disturbance of whales by human activities at LTFs and their associated camps, the movement of log rafts from LTFs to mills, and associated boating and aircraft activities including log raft towing and recreational boating by timber workers (USDA Forest Service, 1991). In addition, humpback whales may become entangled in LTF cables. The one known incidence of whale entanglement in LTF cables occurred in the Tongass National Forest (USDA Forest Service, 1991a).

Timber harvest operations in the Project Area under each of the timber management alternatives are not expected to adversely affect whales that potentially migrate through waters near the Control Lake area.

Steller Sea Lion

The Steller sea lion is primarily associated with the marine environment; therefore, potential impacts from timber management operations in the Project Area are limited to the LTFs and their associated camps, and log shipments from LTFs to their destination. Mitigation measures should reduce disturbance associated with logging operations in the Project Area to acceptable levels under each of the timber management alternatives. Consequently, no alternative is likely to adversely affect sea lions.

Steller sea lion

Alexander Archipelago Wolf

Project effects on the wolf are addressed in the *Wildlife* section.

American, Arctic, and Peale's Peregrine Falcon

The primary effect of the action alternatives on peregrine falcons potentially migrating through the Project Area include localized disturbances of prey species near shoreline areas, particularly waterfowl and shorebirds. Forest-wide Standards and Guidelines protect seabird rookeries and waterfowl concentration areas that occur on the Tongass National Forest (USDA Forest Service, 1991a). In addition, the application of 1,000-foot buffers along the beach fringe and around estuaries should minimize the effect on prey species that occupy shoreline areas under each of the timber management alternatives. Project effects on the peregrine falcon nest in the Project Area can be mitigated by timing restrictions on harvest and road-building activities (see Chapter 2). The closest unit is approximately 1 mile from the nest. Consequently, none of the timber management alternatives is likely to affect peregrine falcons should they migrate through the area.

Osprey

The Control Lake Project is not expected to affect nesting osprey as no known nest sites occur in the Project Area and availability of nesting and foraging areas does not appear to be a factor limiting population growth. In addition, minimal or no effects on preferred osprey habitat are expected from project activities as uncut buffers will be maintained near streams, lakes, and coastal areas. If nests are discovered in the Project Area, Standards and Guidelines outlined in the Forest Plan will be followed.

Eskimo Curlew

None of the timber management alternatives is likely to affect Eskimo curlews because: (1) this species has not been sighted in Alaska since 1986; (2) the Project Area is outside the normal migratory path of the Eskimo curlew; and (3) coastal areas that are most likely to be used by migratory curlews are protected by 1,000-foot buffers, as specified in the forest-wide Standards and Guidelines.

Trumpeter Swan

No direct disturbance to trumpeter swans is expected from the Control Lake Project because most activities will occur during non-winter periods when the swans are absent from the Project Area. Further, the project will not affect ice-free shoreline areas that serve as preferred winter habitats. These areas are protected by riparian, estuarine, and beach fringe buffers.

Aleutian Canada Goose

None of the timber management alternatives are likely to affect the Aleutian Canada goose because: (1) with the exception of an occasional migrant that wanders off its traditional migration route, it is unlikely that this species occurs in the Project Area (personal communication, J. Lindell, Endangered Species Coordinator, USFWS, Anchorage, September 18, 1992); and (2) coastal areas most likely to support migrating geese and are protected by 1,000-foot no-cut buffers.

Marbled Murrelet

Based on survey results, the marbled murrelet appears to nest in relatively high numbers in old-growth stands of the Project Area. Therefore, timber harvest will reduce available nesting habitat. Loss of productive old growth associated with the action alternatives would range from approximately 834 acres or 1 percent of the existing productive old growth for Alternative 10, to 3,328 acres or 4 percent for Alternative 12 (Table 4-9). These reductions are expected to produce similar to slightly higher reductions in marbled murrelet habitat capability. The slightly higher reductions are related to the increased fragmentation of old-growth habitats that would occur under the action alternatives.

Kittlitz's Murrelet

The Project Area is beyond the known southern distribution limits of the Kittlitz's murrelet. Thus, it is very unlikely that Kittlitz's murrelets would occur in the Project Area (personal communication, Nancy Naslund, Wildlife Biologist, USFWS, Anchorage, December 16, 1994). Even if this species were to occur in the Project Area, it is not known to nest in forested habitat affected by the Project, preferring barren ground above the timberline. Thus, there are no effects anticipated to Kittlitz's murrelet from Control Lake timber harvest activities.

Queen Charlotte Goshawk

In addition to the old-growth habitat strategy, the Forest Plan contains measures that address conservation concerns related to the Queen Charlotte goshawk. The Forest Plan direction for maintaining habitat to sustain viable northern goshawk populations relies primarily on the findings of the interagency northern goshawk conservation assessment. This assessment, prepared as part of the forest planning process, synthesized the best available scientific information related to goshawk conservation and provided management considerations for sustaining goshawk populations.

The Forest Plan examined the proportion of old-growth forest remaining, after full implementation of the Forest Plan for 100 years, in each of the 678 "Value Comparison Units" (VCUs) that contain goshawk habitat. A VCU is a geographic area that generally encompasses a drainage basin containing one or more large stream systems. This analysis (see Forest Plan Final EIS, Appendix N) indicates that the proportion of old growth in 620 of these 678 VCUs (91 percent) is effectively consistent with a conclusion in the goshawk assessment that a 300-year rotation across the forest landscape would have a high likelihood of sustaining goshawks. Of the 58 out of 678 VCUs with goshawk habitat that would not be consistent with a 300-year rotation under the Forest Plan, 30 of these are dispersed across the Forest. All of these VCUs are located outside the Control Lake project area. The remaining 28 VCUs are located on the central and northern portion of Prince of Wales Island. The Plan contains two compensatory measures for this area consistent with the findings of the goshawk assessment. First, the Plan designates several very large reserves on this portion of Prince of Wales Island. The Sarkar-Honker/Divide-Karta reserves on northern and central Prince of Wales Island, for example, total over 200,000 acres. Another 200,000-acre preserve is located on the southern portion of Prince of Wales Island and a 58,000-acre preserve on Kosciusko Island. Second, a specific protective standard and a guideline has been added to the Forest Plan to address goshawk habitat in VCUs where more than 33 percent of the productive old-growth forest goshawk foraging habitat has been converted to young conifer stands (i.e., those VCUs that do not meet the effective 300-year rotation). In these units, timber harvest treatments over 2 acres in size must meet certain minimum criteria designated to maintain forest stand structure characteristics beneficial to goshawks.

A more detailed explanation of goshawk protection and management provisions can be found in Appendix N of the Final EIS and is incorporated by reference.

Specific project effects on potential goshawk habitat are represented by the loss of productive old growth, especially medium and high volume old growth. The harvest of productive old growth would range from 1 percent of the Project Area old growth for Alternative 10 to 4 percent for Alternative 12; Alternative 11 would also result in approximately 4 percent of the productive old growth being harvested and Alternative 13 would harvest 3 percent. The harvest of medium-high volume old growth would also range from 1 to 4 percent of that in the Project Area (Table 4-9).

Harlequin Duck

Riparian habitats along all rivers and streams on the Forest will be managed according to the Riparian management prescriptions or a more restrictive management prescription (such as when a stream or river is in a Wilderness Area). Nesting habitat requirements are expected to be maintained. Since winter habitat occurs in the marine environment in areas of high surf and rocky beaches, no effect on harlequin ducks is anticipated with any alternatives of the Control Lake Project.

Olive-sided Flycatcher

Riparian habitats along all lakes, rivers, and streams on the Forest will be managed according to the Riparian management prescriptions or a more restrictive prescription (such as when a stream or river is in a Wilderness Area). Upland habitat value for the olive-sided flycatcher may improve due to logging, particularly with the type of harvest proposed for the Control Lake Project. Created openings will produce greater edge, and the partial cutting and clearcut types prescribed for the Control Lake Project all incorporate varying degrees of reserve trees and snags, which should improve flycatcher habitat. Therefore, the Project may affect olive-sided flycatcher habitat, though the effect is likely to be positive.

Spotted Frog

The distribution of the spotted frog in the Project Area could not be determined from the general walk-through of proposed harvest units and roads. However, based on habitat requirements, spotted frogs are primarily limited to permanent bodies of water (Hodge, 1976; Broderson, 1982; Nussbaum et al., 1983). Forest-wide Standards and Guidelines maintain buffers along shorelines and around all Class I and II streams, many Class III streams, and a 1,000-foot buffer around estuaries. Therefore, impacts to frogs potentially breeding within riparian areas should be minimized under each of the timber management alternatives. However, some incidental impacts would occur to forested muskegs and small ponds within harvest units (generally less than 0.1 acre).

Prince of Wales Spruce Grouse

The comprehensive conservation biology strategy to assure long-term species viability as discussed in the TLMP Final EIS, including Appendix N, applies to the spruce grouse. Given this strategy and the fact that the action alternatives would harvest only 1 to 4 percent of the productive old growth, no significant effects are expected with any of the alternatives.

Cumulative Effects

Cumulative effects are the result of changes in the environment caused by the interaction of natural ecosystem processes and the effects of multiple management actions. Wildlife habitat and associated populations of threatened, endangered, and sensitive species may be influenced by the result of multiple entries to remove timber within the Project Area, and the combined or synergistic effects of habitat loss in adjacent areas. The humpback whale, Steller sea lion, peregrine falcon, osprey, Eskimo curlew, trumpeter swan, Aleutian Canada goose, Kittlitz's murrelet, harlequin duck, olive-sided flycatcher, and spotted frog are unlikely to experience long-term cumulative effects because of their limited use of the area or because their habitats are unaffected or minimally affected by timber harvest. The populations of Queen Charlotte goshawk and marbled murrelet may experience long-term declines under the revised Forest Plan (1997). However, the revised Forest Plan is expected to provide a sufficient amount and distribution of habitat to maintain viable and well distributed populations across the Tongass after 100 years (USDA Forest Service, 1997).

The new Forest Plan (1997) includes an old-growth habitat strategy that is intended to maintain well-distributed viable populations across the Tongass. It is designed to reduce fragmentation of old-growth habitat and has been developed through careful analysis and integration of the best scientific information available on the subject (see Appendix N of the Final EIS, USDA Forest Service, 1997). The old-growth habitat conservation strategy incorporated into the new Forest Plan, consists of two basic components: (1) a forest-wide reserve network and (2) a matrix management strategy.

Mitigation

Mitigation for threatened, endangered, and sensitive species results primarily from avoidance of known special use sites such as nest sites for birds and haulout areas for sea lions. Several special use sites were identified during field investigations and literature reviews for the Control Lake Project. Mitigation measures, including buffer zones, have been designed to avoid these sites during project activities. The final unit layout and road location that would occur before harvest would provide one more level of observation and opportunity for avoidance. Goshawk nests were identified in the Logjam Creek and Rio Robert Creek areas. Region 10 goshawk management guidelines (see TLMP, 1997) will be implemented (Mitigation Measure W9).

A peregrine falcon nest had been identified on the Steelhead Creek drainage. Harvest and road construction activities will be restricted during the nesting season within one-half mile of active nests (Mitigation Measure W14).

Mitigation measures for humpback and other whales would include: (1) the avoidance of Forest Service aircraft flights below 500 feet above sea level in the known vicinity of whales when weather ceilings permit; (2) the avoidance of the intentional approach of a vessel of 100 feet or more in length within one-quarter mile of whales when safe passage exists; (3) and the avoidance of approach of a vessel of less than 100 feet in length to within 100 yards of whales when safe passage exists (Mitigation Measure W13).

A standard Forest Service timber sale contract clause will be included in all timber sale and road construction contracts to provide for protection of threatened, endangered, and sensitive species and their habitats. If a threatened or endangered species is sighted or its sign is found, the USFWS will be notified immediately.

Monitoring

Monitoring activities identified under the *Wildlife* section are also relevant to threatened, endangered, and sensitive species. Additional forest-wide monitoring for threatened, endangered, and sensitive species is conducted under the Forest Plan. Chapter 6 of the Forest Plan specifically guides area monitoring efforts.

Biodiversity

Key Terms

Between-stand diversity—reflects the amount of species turnover between habitat types or along environmental gradients (Sidle 1985).

Biodiversity—the variety of lifeforms in an area, including variation in structure, composition and function at scales from genetic to landscape.

Edge—the natural or human created boundary between two distinct ecological systems, such as between forest and muskeg, or forest and a clearcut.

Edge effects—the biological and abiotic actions operating at edges; examples are differences in microclimate, species richness, productivity and predation.

Fragmented—reduced in size and connectivity—the degree of fragmentation is dependent upon scale (in space and time) and species specific life requisites.

Landscape-level diversity—a function of the spatial distribution of habitat types across a large area (Sidle 1985) such as a Project Area or ecological province.

Stand-level diversity—the diversity within specific habitats or limited land areas as measured by number of species present (species richness) or structural complexity of a given habitat type (Sidle 1985).

Viable population—the number of individuals of a species required to ensure the long-term existence of the species in natural, self-sustaining populations well distributed throughout their range in the Tongass National Forest.

Each of the action alternatives would result in changes in biodiversity at the stand, between-stand, and landscape levels. Stand-level diversity would decline temporarily as old growth is replaced by areas subject to regeneration harvests, gradually increase during early stages, and decline again during the sapling/pole stage as the canopy closes and understory vegetation is eliminated. The inclusion of snags and reserve trees as islands of old growth within regenerating stands and precommercial thinning to promote understory vegetation would at least partially offset some of the early seral declines in species richness.

The action alternatives for the Control Lake Project have all been designed to incorporate a high degree of reserve tree and snag retention. Only 18 to 34 percent of the proposed harvest acres in the action alternatives would be clearcut. Even these acres would include reserve trees. About 63 to 69 percent of the proposed harvest acres would include non-clearcut regeneration harvests which would maintain a high degree of the residual stand. Finally, the action alternative would result in from 1 to 14 percent harvest by uneven-age management. Non-clearcut regeneration harvests and uneven-age management are expected to maintain a substantial portion of the stand-level diversity associated with old growth.

Between-stand diversity is expected to increase under all action alternatives due to greater contrast between patch types created by harvest units in juxtaposition with the old growth. Edge-related factors would be lower with the types of harvest proposed for the Control Lake Project.

Diversity on a landscape level would change under each of the action alternatives due to habitat fragmentation. Alternatives that include proposed harvest in the Elevenmile, Shinaku, and Rio Roberts watersheds and west of Control Lake, would contribute to the fragmentation of relatively unfragmented old-growth patches in those areas. Alternatives 10 and 13 would minimize this landscape-level fragmentation. Landscape-level fragmentation would be greatly limited by the extensive system of OGHRs and non-development LUDs in the Project Area and adjacent portions of Prince of Wales Island that are prescribed by the Forest Plan. In addition, forest-wide standards and guidelines, including those dealing with beach and estuary fringe, riparian areas, and karst/cave resources will further limit landscape-level effects.

As previously noted, the Control Lake Project proposals are fully consistent with the Forest Plan land allocations and standards and guidelines. Biodiversity, as addressed for the Forest Plan in its Final EIS on pages 3-27 to 3-39, is incorporated by reference. Appendix N is also incorporated by reference, particularly the sections on the old-growth strategy and its relationship to management of the matrix outside of reserves.

Most harvest proposed in the Control Lake alternatives would occur in areas that have had previous harvest activity. Past management activities in these areas have fragmented patches of old growth. New harvest would continue this trend.

Old Growth Habitat Reserves

The small mapped Old Growth Habitat Reserves (OGHRs) have been evaluated by an interagency group of biologists from the Forest Service, U.S. Fish and Wildlife Service, and Alaska Department of Fish and Game. They assessed the reserves for size, spatial location related to other OGHRs, logical boundaries, connectivity of the network and overall biological function. Based on their assessment, adjustments to the Rush Peak, Rio Roberts, and Steelhead OGHRs were recommended. Figure 4-1 displays the OGHRs along with potential adjustments to the affected OGHRs. If these recommendations are adopted, a non-significant Forest plan amendment would be required.

Rush Peak - This OGHR contains extensive roads and regeneration areas from past development. The proposed adjustment would delete acres in the northwest part of the reserve and add acres to the Honker Divide Reserve in the drumlin field north of the 30 Road. Overall, it is expected this adjustment would free up developed lands for future additional development while still providing a reserve that meets the size requirements of Appendix K of the Forest Plan. The adjustment would also protect high value and sensitive habitat associated with the drumlin fields. The 30 Road also makes a more logical and readily identifiable management boundary.

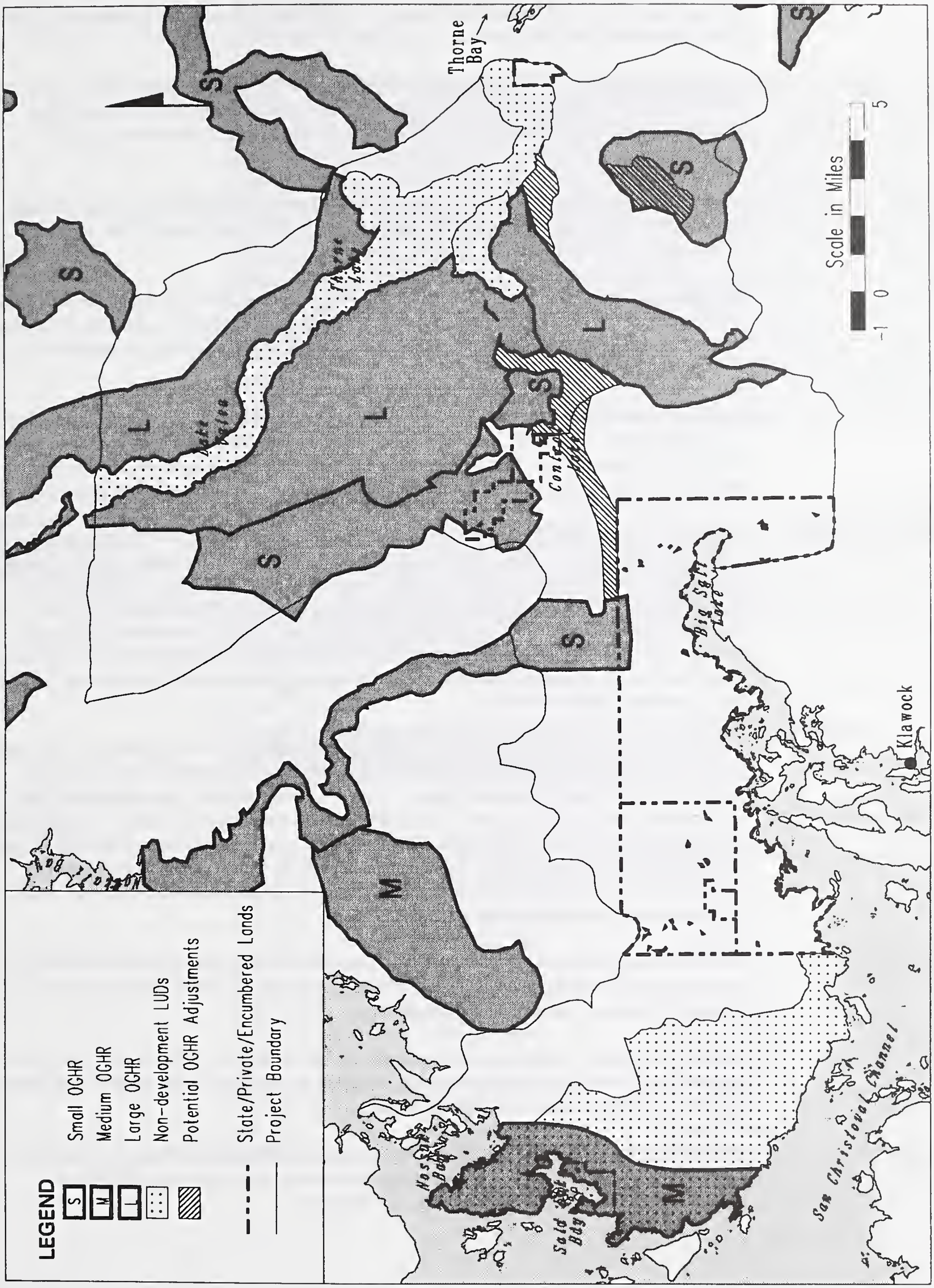
Rio Roberts - This adjustment would include the remaining area of the Rio Roberts watershed not currently included in the reserve. The adjustment would be made by using the VCU boundary between VCUs 595 and 596. This would further protect the Rio Roberts watershed and widen the connective corridor between the Honker Divide OGHR and Karta Wilderness (functions as a medium OGHR) to the south of the project area.

In discussions with USFWS biologists, it was requested that harvest units 597.2-449 and -450 be deferred and that 597.2-414 be switched to helicopter yarding to existing roads. The intent of this recommendation would be to strengthen the connectivity to Karta Wilderness to the south. Unit 597.2-450 has been deleted because it does not meet Forest Plan Standards and Guidelines. Access to units 597.2-457, 458 and 459 would require about 2.4 miles of road construction within the west side of the Rio Roberts OGHR. Alternative access to these units would require road construction within the Rio Beaver RMA.

Steelhead - This proposed adjustment would add a linear, small OGHR that would provide a connective corridor between the Honker Divide OGHR and the Election Creek small OGHR and to the west. This adjustment would exceed the criteria identified in Appendix K of the Forest Plan, but would protect a minimum corridor over time, especially at lower elevations. The zone between the Election Creek OGHR and the Honker Divide OGHR is several miles wide

Figure 4-1

Potential Adjustments to Old-Growth Habitat Reserves



and provides old-growth connectivity between the reserves. This zone is currently allocated to Scenic Viewshed, Modified Landscape, and Timber Production LUDs.

No harvest is proposed in any of the Old-Growth Habitat Reserves, including the Western Peninsula Semi-remote Recreation LUD that serves as a medium reserve. However, if the recommended adjustments to the small OGHRs were implemented, the following units/ alternatives would be affected:

Rush Peak—Harvest unit 597.1-406, totaling about 43 acres, is located north of the 30 Road and is included in Alternative 12. Proposed adjustment to the Rush Peak OGHR would not affect any other alternatives.

Rio Roberts—Four units, 596-409, 410, 416, and 417, totaling about 197 acres, are included in Alternatives 11 and 12. Units 597.2-414 and -449, which have been recommended for helicopter yarding and deferral, respectively, by the US Fish and Wildlife Service, are included in Alternatives 10, 11, and 12.

Steelhead—Units, 595-407, 408, 409, 412, 413, and 414, totaling about 173 acres, are included in Alternatives 11, 12, and 13. Units 595-407, 414, 408, and 409, totaling about 103 acres, are included in Alternative 10. The zone between Election Creek OGHR and the Honker Block will function as a corridor connector after implementation of any of the alternatives.

Population Viability

Maintenance of viable wildlife populations well distributed across National Forest System lands, where multiple-use management is emphasized in the resource planning process, should be soundly based on conservation biology principles. To accomplish this, biologists indicate that sufficient amounts of suitable habitat areas should remain well distributed across the Tongass National Forest. The Forest Plan Revision (TLMP 1997) incorporates a variety of measures including an old-growth habitat conservation strategy and species-specific management prescriptions designed to maintain well-distributed viable populations across the Tongass (see *Cumulative Effects* section).

Under the Forest Plan, the expanded use of Old Growth Habitat LUDs in the Project Area will increase the acreage and connectivity of old-growth habitat. The distribution of LUDs that prohibit timber harvest is shown in Figure 4-1, Figure 1-5 in Chapter 1, and on the large map accompanying this EIS. Under the new TLMP, the size of the protected Honker Divide block has been substantially increased, and smaller blocks are located in a number of watersheds. An expanded Semi-Remote Recreation LUD in the Elevenmile area would serve as old-growth retention also. Connectivity would stretch from the Karta Wilderness to the south of Control Lake to the north end of Prince of Wales Island.

Cumulative Effects

The wildlife and biodiversity cumulative effects analyses recently developed in the Final EIS (and Appendix N) for the new Forest Plan (USDA Forest Service, 1997) and summarized in the Record of Decision, is incorporated by reference.

Mitigation

Mitigation measures relating to wildlife and threatened, endangered, and sensitive species are applicable to biodiversity. These mitigation measures are discussed in the *Wildlife* and *Threatened, Endangered, and Sensitive Species* sections.

Monitoring

Monitoring activities relating to wildlife and threatened, endangered, and sensitive species are applicable to biodiversity. These monitoring activities are discussed in the *Wildlife* and *Threatened, Endangered and Sensitive Species* sections.

Lands

Key Terms

Alaska Native Claims Settlement Act (ANSCA)—provides for the settlement of certain land claims of Alaska Natives.

Encumbrance—a claim, lien, charge, or liability attached to and binding real property.

Native selection—application by Native corporations to the USDI Bureau of Land Management for conveyance of a portion of lands withdrawn under ANSCA in fulfillment of Native entitlements established under ANSCA.

Special use permits—permits and granting of easements (excluding road permits and highway easements) authorizing the occupancy and use of land.

State selection—application by Alaska Department of Natural Resources to the Bureau of Land Management for conveyance of a portion of the 400,000-acre State entitlement from vacant and unappropriated National Forest System lands in Alaska, under the Alaska Statehood Act.

Harvest Units Adjacent to Non-national Forest System Lands

No proposed harvest units with any of the alternatives would be located on the boundary between National Forest and non-National Forest System land. There would be a maximum of 12 harvest units in the Project Area that would be located within 0.25 mile of non-National Forest System lands with Alternative 12. The units are displayed in Table 4-19. Alternative 10 would have only 2 units located within 0.25 mile of non-National Forest System lands. All units would have boundary lines established prior to implementation to ensure that harvest does not encroach on non-National Forest land.

Table 4-19

Proposed Harvest Units Adjacent to or Within 0.25 Mile of Non-National Forest System Lands

Harvest Unit	Location	Adjacent Owner	Alternatives That Include Unit
593-421	Elevenmile Creek	Sealaska	12
593-424	Elevenmile Creek	Sealaska	12
593-431	Elevenmile Creek	Sealaska	11, 12
594-416	Kogish Mountain Area	Sealaska	11, 12, 13
594-419	Kogish Mountain Area	Sealaska	10, 11, 12, 13
594-420	Kogish Mountain Area	Sealaska	10, 11, 12, 13
595-402	Control Lake	State of Alaska	11, 12, 13
595-403	Control Lake	State of Alaska	11, 12, 13
595-412	Steelhead Creek	Sealaska	11, 12, 13
595-418	Steelhead Creek	Sealaska	11, 12, 13
596-406	Control Lake	State of Alaska	11, 12, 13
596-407	Control Lake	State of Alaska	11, 12, 13

No units are within 0.25 mile of the Karta Wilderness, although three units are within 0.5 mile of the boundary (Table 4-20). Several units lie within 0.25 mile of restrictive LUD's under the 1997 TLMP Revision. These LUD's include the Rio Roberts RNA; the Semi-Remote Recreation Area near Salt Lake Bay, and Old Growth Habitat LUD's.

Table 4-20
Proposed Harvest Units Within 0.5 mile of the Karta Wilderness

Harvest Unit	Location	Alternatives that Include Unit
595-421	Steelhead Creek	11, 12, 13
595-433	Steelhead Creek	10, 11, 12, 13
597.2-449	Rio Roberts Creek	10, 11, 12, 13

Rights-of-way and Land Use Agreements

Logging adjacent to non-National Forest System lands may require right-of-way or land use agreements for establishing roads, establishing tailholds, suspending logging cables over non-National Forest roads or lands, and for establishing new or reusing old LTF sites.

Eight units in VCU 594 near Kogish Mountain are currently planned to be accessed via Sealaska Native Corporation roads north of the Big Salt Lake. Other options for these units include tying the road system into the existing roads in the Staney Creek Watershed to the north. The eight units in question are listed in Table 4-21 by alternative.

Table 4-21
Proposed Harvest Units to be Accessed by Roads on Sealaska Lands North of Big Salt Lake

Harvest Unit	Location	Alternatives that Include Unit
594-401	Kogish Mountain Area	11, 12, 13
594-407	Kogish Mountain Area	11, 12, 13
594-409	Kogish Mountain Area	11, 12, 13
594-410	Kogish Mountain Area	11, 12, 13
594-415	Kogish Mountain Area	11, 12, 13
594-416	Kogish Mountain Area	11, 12, 13
594-418	Kogish Mountain Area	11, 12, 13

To minimize impacts from harvest activities, it will be necessary to directionally fall timber away from non-National Forest lands. Tree felling requirements will be analyzed and negotiated on a case-by-case basis, depending on site-specific logging/transportation systems.

Land Use Designations

Timber harvest within the LUD's found in the Project Area would be consistent with the standards and guidelines established in the TLMP. All alternatives would be consistent with the new Forest Plan. See Chapter 1 for information concerning other comprehensive plans.

Special Use Permits

None of the alternatives would affect existing special use permits nor are there any anticipated effects on future special use permits.

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Transportation and Facilities

Key Terms

A-frame LTF—log transfer facility system which consists of a stationary mast with a falling boom for lifting logs from trucks to water. This system is generally located on a shot rock embankment with a vertical bulkhead to access deep water, accommodating operations at all tidal periods.

Access management—the designation of roads for differing levels of use by the public.

Aquatic Habitat Management Unit (AHMU)—a mapping unit that displays an identified value for aquatic resources; a mechanism for carrying out aquatic resource management policy.

Arterial roads—roads usually developed and operated for long-term land and resource management purposes and constant service.

Endless chain LTF—log transfer facility system which consists of a gravity slide ramp for sliding log bundles into the water, with a chain assist system to slow the velocity of logs entering the water.

Collector roads—roads that collect traffic from Forest Local roads; usually connect to a Forest Arterial road or public highway.

Local roads—roads that provide access for a specific resource use activity such as a timber sale or recreational site; other minor uses may be served.

Log Transfer Facility (LTF)—a facility that is used for transferring commercially harvested logs to and from a vessel or log raft, or the formation of a log raft.

Main trunk roads—primary roads that are used repeatedly for forest access over long period of time.

Maintenance levels—levels at which roads are maintained (or closed) for various uses, including high-clearance vehicle and passenger vehicle use. See Glossary for more detail.

Modular bridge—a portable bridge constructed of components that can be readily assembled and disassembled for movement from one site to another.

Specified roads—a road, including related transportation facilities and appurtenances, shown on the Sale Area Map and listed in the Timber Sale Contract. These roads are constructed as permanent roads as part of the forest development transportation system.

Temporary roads—short term roads built for limited resource activity or other project needs.

Traffic service levels—traffic characteristics and operating conditions that are used in setting road maintenance levels.

Introduction

The effects of the transportation system on other resources are considered in the specific resource sections (e.g., *Soils; Watershed, Fish, and Fisheries; Wildlife; Recreation*). This section focuses on the effects of each alternative on the transportation system. The discussion is grouped into the following categories: (1) road development, (2) rock quarries, (3) maintenance level, (4) access management, and (5) logging camps and log transfer facilities.

Road Development

Table 4-22 displays the miles of new road construction by alternative. Alternative 12 would require the most miles of road construction. Alternative 10 would require the least miles of road.

Table 4-22
Miles of New Road Construction by WAA for Each Action Alternative

WAA	Alternative 10	Alternative 11	Alternative 12	Alternative 13
1318	7.2	17.5	18.3	18.3
1319	11.9	25.2	35.2	19.0
1323	0.0	9.7	14.9	0.5
1421	0.0	4.7	8.6	4.7
Total	19.1	57.0	77.0	42.5

SOURCE: GIS query

Alternatives 11, 12, and 13 have seven units in VCU 594 that would be accessed from existing private (Sealaska) roads.

Typical forest road

Alternative 10, with 19 miles of road construction, would extend the road system primarily in the Steelhead Creek, Rio Beaver Creek, Shinaku Creek watersheds. The total length of individual new road extensions would not exceed about 4 miles.

Alternative 11, with 57 miles of road construction, would extend existing roads further into the Steelhead, Lower Logjam, Rio Roberts, Rio Beaver, Shinaku, and Elevenmile watersheds. The total length of individual new road extensions would not exceed about 6 miles.

Alternative 12, with 77 miles of road construction, would extend existing roads into the same watersheds as Alternative 11. However, roads would be extended further in the Elevenmile, Lower Logjam, and Upper Thorne watersheds. The total length of individual new road extensions would not exceed about 8 miles.

Alternative 13, with 42 miles of road construction, would extend the road system primarily in the Steelhead, Rio Beaver, Shinaku, and Lower Logjam watersheds. The total length of individual new road extensions would not exceed about 4 miles.

Three classes of road could be constructed as part of the proposed project, each of which has different projected uses and construction standards. The three classes are arterial, collector, and local roads. No arterial roads are planned for construction in the Control Lake Project Area. Temporary roads, which are short-term roads for timber harvest activities, were considered local roads for analysis purposes, since these roads are similar to local roads.

Collector roads are generally mainline system roads requiring higher standards and heavier investment than local roads to accommodate prolonged use. Examples of higher investments include more turnouts, more permanent stream crossings, ditching, etc.

Local roads tend to be used intermittently, allowing use of lower construction standards, and local roads are generally less costly than the collector roads. These roads may have use restrictions during harvest activities that limit public access for safety.

From 2 to 7 miles of existing roads would need to be reconstructed under all action alternatives. These activities would range from major culvert and bridge replacement to minor blading and shaping of the existing road.

Construction Coordination with Fish and Wildlife

Development in some areas may require road construction or reconstruction near inventoried eagle nest trees. There is no road construction anticipated to be within 330 feet of any known eagle nest tree in the Project Area. It is standard practice to locate roads and other facilities at least 330 feet away from eagle trees unless terrain or physical requirements such as road grade prevent such an avoidance.

Some stream crossings have been identified as needing fish-timing restrictions for construction of structures, to minimize impact on young fish and fry. Generally, these restrictions can be accommodated through planning and scheduling of the construction activities. However, in many cases, additional costs would be incurred to accommodate the timing restrictions. Such costs would include additional equipment mobilization and demobilization and increased construction actions for mitigation. For these roads and/or units, it may be necessary to conduct multiseason road construction and harvest. The restriction period for fish is a combination of coho, pink and chum, sockeye, and steelhead restrictions. Streams with these timing restrictions would be surveyed prior to implementation to determine species use. The District Fish and Wildlife Biologist would be consulted during the year of activity to determine final timing restrictions, based on use of the area by the species of concern, and to determine if waivers or variances are necessary. The objective is to provide a reasonable operating window while still meeting the specific resource objectives.

The Thorne Bay Ranger District has developed several options to increase the length of the construction window, based on previous project experience. These include installation of a log stringer bridge, which allows equipment across a creek without any instream construction; on small, nonfish bearing streams, dam and divert water around the site during culvert placement and rocking; install culverts or bridges during low flow periods or when streams are frozen. Consultation with the District Fish and Wildlife Biologist would be necessary to determine appropriate options for each site.

Instream activity associated with anadromous fish waters will be coordinated with the Alaska Department of Fish and Game (ADF&G) in compliance with Alaska Statute 16 and as outlined in the March 16, 1998, Supplemental Memorandum of Understanding between the Forest Service and ADF&G regarding fish habitat and passage.

Rock Quarries

Generally, rock quarries are located every 1 to 2 miles along roads. The quarry location is determined by the quality of the rock sources, haul distances, development costs, frequency of entry, and visual resource considerations. An allowance for rock quarries is included in the acres shown for road right-of-way clearing (see *Soils* section in this chapter).

Some rock quarries are small and would involve one-time uses, while others would be expanded during future road building operations if quality rock is available. Rock quarries with expansion potential would be retained for expansion, particularly in situations where potential roads and timber harvest may be developed in the future, or where numerous roads radiate out from a point near a centralized quarry. Rock quarries near the ends of the road system would be closed and reclaimed by spreading stockpiled overburden on the floor of the quarry.

Each quarry would be evaluated for disposition during the construction stage. Each quarry would be evaluated for the following: (1) availability of additional quality rock, (2) feasibility of expansion, (3) future rock resource needs in the area, and (4) proposed VQOs.

Maintenance Level

Maintenance levels are based on anticipated road use. The maintenance levels also incorporate traffic service levels and access management. Applicable maintenance levels for the Project Area are as follows:

- Maintenance Level 1 (Traffic Service Level D)—Roads are closed by bridge removal or organic encroachment and are monitored for resource protection. Basic custodial maintenance is performed to perpetuate the road and to facilitate future management activities.

- Maintenance Level 2 (Traffic Service Level C)—Roads are maintained for high-clearance vehicles and monitored for resource protection. Traffic is normally minor, usually consisting of ongoing silvicultural and incidental recreational uses.

- Maintenance Level 3 (Traffic Service Level B)—Roads are maintained for travel by a prudent driver in a standard passenger vehicle and are subject to the provisions of the Highway Safety Act. Road use is by administrative and passenger vehicles, as well as logging trucks.

Maintenance levels and traffic service levels are shown by specific road segment in the table at the beginning of Appendix E. Most new roads in the Project Area would receive Maintenance Level 1 for Traffic Service Level D.

Generally, collector roads would remain open for ongoing silvicultural activities. Maintenance of these roads would consist of monitoring road and drainage structures for function and environmental condition. Maintenance levels would fluctuate in response to changing uses. During periods of limited use, maintenance standards are sufficient to provide only for public safety and resource protection (i.e., Maintenance Level 2 and Traffic Service Level C). This level road is maintained for high clearance vehicles and passenger car traffic is not a consideration.

Many local roads to harvest units, including the short road segments for yarders within harvest units, would not be retained as part of the permanent transportation system. These roads receive Maintenance Level 1 and Traffic Service Level D. After these roads have served their intended purpose, the roadbed would be effectively blocked to normal vehicular traffic, the drainage structures removed, and the roadbed would be waterbarred. Some of these roads are temporary but are considered here as local roads. Because such roads may be constructed through rock, they cannot easily be reclaimed.

Access Management

Post-harvest access management of forest roads is utilized where necessary to control any class or type of traffic. Use is managed to prevent damage to the roadway and to meet management direction for wildlife, water, and other resource objectives. The following access management categories apply:

- Encourage—Motor vehicle use is encouraged by appropriate signing, public notification, and active maintenance of the road prism.
- Accept—Motor vehicle use is allowed but not encouraged, while the road is maintained for administrative access.
- Discourage—Motor vehicle use is discouraged by allowing alder growth at road entrance, nonremoval of blowdown, or road prism deterioration within acceptable environmental limits (depending on designated maintenance level). To discourage use, the road may also be signed as "Not Maintained for Motor Vehicle Traffic."
- Eliminate—Motor vehicle use is eliminated by physically blocking the road. Where prescribed for long-term intermittent roads, this strategy is achieved by placement of impassable barricades at road entrances. On short-term roads, removal of drainage structures effectively blocks vehicle traffic.
- Prohibit—Motor vehicle use is prohibited by a road order (CFR closure). Implementation of this strategy on remote road systems may require the installation of gates, in addition to public notification and appropriate signing.
- Prohibit Seasonally—Road is closed to motor vehicle use at times during the normal operating year. For all alternatives, seasonal prohibitions will be used as necessary to mitigate impacts to wildlife and subsistence resources (e.g., closure during either-sex deer hunting season). Administrative and permitted use of the roads will continue during closure periods, but only for specific permitted uses. Seasonal closures may be used in combination with cooperative efforts with fish and game protective agencies.

Specific post-harvest traffic strategies or access management are described below with regard to fisheries, wildlife, and recreation concerns. Access into newly entered drainages would be discouraged or eliminated to minimize wildlife impacts unless there is an ongoing silvicultural need. Other uses of these roads would be less than the traffic of the harvest activity and would be incidental to the ongoing silvicultural activities. Roads are closed for several reasons, including fish and wildlife protection, and inadequate maintenance funding. Roads under Forest Service jurisdiction can be closed by authority of CFR 36, Chapter 11, Parts 212.7 and 261. Road closure orders would be posted at the Thorne Bay Ranger District Office. Because U.S. mining laws confer a statutory right to enter public lands to search for minerals, access to mining claims would not be restricted. However, miners and prospectors would be required to obtain a permit to use restricted roads.

Depending on the alternative selected, 18 (Alt. 10), 53 (Alt. 11), 54 (Alt. 12), or 38 (Alt. 13) miles of newly constructed roads are proposed for closure following completion of harvest activities. In addition, up to 51 miles of existing roads are proposed for closure under all alternatives. These road closures are shown in the access strategy map at the end of Chapter 2 and in the large-scale color map accompanying this EIS. Access management of existing roads will be based in part on comments received during public involvement efforts for the Supplemental Draft EIS and the Thorne Bay access management public involvement efforts. For example, the existing 3013200 Road that accesses Rush Peak Lake will be left open. Similarly, the 3013 Road west of Rush Peak Lake will be left open.

Motorized road access to several areas within the Control Lake Project Area would be eliminated because of economics or the sensitivity of fisheries, wildlife, and subsistence resources. Motorized vehicle restrictions include passenger vehicles, four- and three-wheel sport vehicles, and motorcycles. The areas of primary concern are the Elevenmile area for subsistence and in the Honker, Rio Roberts, Rush Peak, and Election Creek Old Growth Habitat reserves. In addition, new roads would be closed in the Logjam Creek watershed due to wildlife concerns, including goshawk and wolf.

In areas where long-term timber management is planned, some roads would be left open, primarily to provide for timber harvest, salvage, firewood, free use, and other management activities. For example, the new road near Angel Lake in VCU 597.2, and most existing roads in Rio Beaver and Steelhead Creek watershed would be left open for these reasons. In some cases open roads may be seasonally closed to reduce hunting and trapping pressure or during sensitive periods for wildlife (e.g., nesting, denning).

The access management strategy proposed for the Control Lake Project Area was developed with the following key points.

- Road use would in general be "eliminate" rather than "prohibit." Formal CFR road closures (prohibiting use) are planned for roads in several key subsistence use areas. Other CFR closures are already in effect (on FDR 3005 at Cutthroat and on 3016 at Honker).
- The access plan for the existing roads in the Project Area focuses primarily on reducing future road maintenance costs while keeping open those roads identified as key by the public in the ongoing access management process. The access plan also closes roads in key subsistence use areas and old growth protection LUDs.
- All new construction roads would be closed with the exception of 3013155 Road to Angel Lake.
- New construction roads to be closed that are less than 1.0 mile in length would generally be placed in storage and all drainage structures would be removed. This equates to a FPA status of "closure."
- New construction roads longer than 1.0 mile would generally be placed in Maintenance Level 1. This equates to a FPA status of "inactive."
- The existing road closures of the 3005000 (Cutthroat Lake) and 3016 (East Honker) would be maintained in this access plan. These closures were originally identified in the 1989-1944 Operating Period EIS and have been in place during and since construction. These closures were intended to help protect the wildlife and recreational values of these areas. The 1989-1994 EIS directed special roadside cleanup measures along the Cutthroat Lake road to enable it to be developed into a trail once logging activities were completed. These cleanup measures were utilized; however, use of this road as a trail has not developed to a great extent due to the poor surface of the road (large rocks). The Cutthroat Lake (3005000) and East Honker (3016) roads will be evaluated in the ongoing district access management process for potential trail use. Trail proposals for these roads may be developed in the future.

Roads will be generally closed by pulling rock from the roadbed for a length of approximately 100 feet near the beginning of the road. This rock will be used to construct a berm and a pullout/turnaround near the rock blockage. Surplus rock removed from the road bed will be hauled to a designated disposal area. Removing rock borrow will be done in accordance with two typical methods. One of these typical closures leaves some of the rock making a trail approximately 4 feet wide. This allows for motorized use by ATVs and trailbikes. This closure will be used on longer roads where allowing the ATV use is necessary for precommercial thinning and other project work. The second closure method removes all of the rock so any form of motorized use is difficult. If inappropriate use occurs on these roads, CFR closures may be applied.

Roads tributary to roads closed by either of the above methods would generally be blocked with a tank trap or other barrier at its intersection with its parent road. This would further restrict motorized use of the road.

Actual road closures may be delayed for up to several years after harvest to accommodate silvicultural activities such as salvage, firewood gathering, and stocking surveys.

Existing roads that are scheduled for storage that are scheduled for timber harvest under the ROD will be placed in storage following haul using post-haul maintenance. Existing roads that are scheduled for storage that are not used for timber haul in the ROD units will be placed in storage as funding permits.

Storing a road is similar to road obliteration (it equates to a Forest Practice Act "closed" road). Work includes removal of all CMPs, bridges, and other drainage structures; reestablishing natural stream channels; effectively blocking the beginning of the road; construction of waterbars and other erosion protective measures; seeding and fertilizing; and other measures as appropriate.

The table at the beginning of Appendix E shows existing and proposed roads and the access strategy planned for the road by the end of the project. This assumes roads would be open during the timber sales, although some of these may be restricted to the public for safety reasons during the timber sale activities.

Log Transfer Facilities

There are currently three LTFs available to serve the Project Area. These LTFs are located at Winter Harbor (on Tuxekan Passage), Naukati (also on Tuxekan Narrows), and at Klawock (on Klawock Inlet). The LTF in Klawock is privately owned and is available for use on a fee basis.

The LTFs at Naukati and Winter Harbor could be used to implement this project. Under the No Action Alternative, use of these existing LTFs would continue for other projects.

The A-frame LTF at Thorne Bay is being removed and cleaned up as part of the KPC Long-term Contract Settlement Agreement. It is anticipated that in the future, most logs will not be placed in the water at Thorne Bay but rather transported by methods such as barging. Additionally, it is expected that some of the timber sales will be purchased by businesses located on Prince of Wales Island and likely will not need to use LTFs.

The major potential impact involving LTFs is the accumulation of log debris in the marine environment. During the transfer of logs from land to water, bark would be sloughed off and could be deposited on the ocean bottom; bark also is continually sloughed off by agitation by wind and waves while logs are in rafts. Bark accumulation on the bottom can diminish habitat for bottom-dwelling crustaceans and mollusks, as well as hamper underwater vegetation used as food and rearing sites for marine fish and other organisms. The discharge of bark into the water at an LTF is a discharge requiring a national Pollution Discharge Elimination System (NPDES) permit. The environmental effects from this timber entry will be limited to that allowed under the existing permits and their required monitoring. Which, if any, LTF is used will depend on the purchaser of individual timber sales, where they process the timber, and to whom they sell the wood.

Monitoring

Road monitoring tasks are contained in the Ketchikan Area Monitoring Strategy (USDA Forest Service, 1994). Refer to TLMP 1997 monitoring also. Road monitoring is also discussed in the *Soils* and the *Water, Fish, and Fisheries* section.

Economic and Social Environment

Key Terms

Cant—a squared log destined for further processing.
Discounted benefits—the sum of all benefits derived from the Project Area over the life of a project.
Discounted costs—the sum of all costs incurred from the Project Area during the life of the project.
Mid-market—the value and product mix represented at the quarter in which the pond log value (end-product selling price less manufacturing cost) for the species and product mix most closely matches the point between the ranked quarters of the Alaska Index Operation pond log value, adjusted to Common Year Dollars, where one half of the harvest of timber from the Tongass National Forest has been removed at higher values and one half of the timber has been removed at lower values, during the period from 1979 to the current quarter (FSH 2409.22 R10 Chapter 531.1-2).
Present Net Value (PNV)—the difference between total discounted benefits and total discounted costs associated with the alternatives.

Introduction

When comparing the alternatives that produce similar results, economic analysis is useful. In preparation of the EIS, the Forest Service is mandated to consider a range of alternatives for accomplishing a specific project and determine their respective costs and benefits. The rationale behind this mandate is that the decision to utilize scarce public natural resources requires balanced and thoughtful deliberation among management actions that affect the quality of the environment. Central to the analysis process is the concept of value, which is represented by the monetary value of the costs and benefits derived from using natural resources. In essence, the Forest Service manages a portfolio of public assets, and by selecting a specific course of action, the Forest Service uses capital in the form of stumpage value, or the value per acre of logs, to help defray forest management expenses.

Southeast Alaska citizens rely on the availability of natural resources from the Tongass National Forest. Their economic well-being and livelihood are inextricably tied to these resources. The Forest Service is required by the National Forest Management Act (NFMA, 1976), and Forest Service policy and manual direction to perform economic efficiency and economic equity or distributional analysis as part of the National Environmental Policy Act (NEPA) process. Economic efficiency is concerned with getting the most output for each dollar spent. Economic equity is concerned with who benefits from (jobs, tax base) and who pays for forest management activity.

Economic Evaluation

The economic impacts of the Control Lake Project Area alternatives can be evaluated in a number of ways. The value of the standing timber or "stumpage value" is evaluated. Stumpage value is the amount of compensation the Forest Service receives when the timber is harvested and is a measure of economic efficiency. In addition to returns to the U.S. Treasury, stumpage values indirectly affect fiscal conditions in local communities through payments to the State. PNV is used to determine public investment viability. PNV is the difference between the discounted value of all outputs to which monetary values or established prices are assigned and the total discounted costs of managing the area. PNV is useful in analyzing investments in timber harvest activities and capturing the benefits and costs that are realized over a period of time. From a social welfare perspective, the volume of timber available for harvest under each alternative supports a different level of job opportunities in timber-related industries. A more detailed analysis of these important economic indicators is included in the following discussion.

Economic Efficiency Assessment

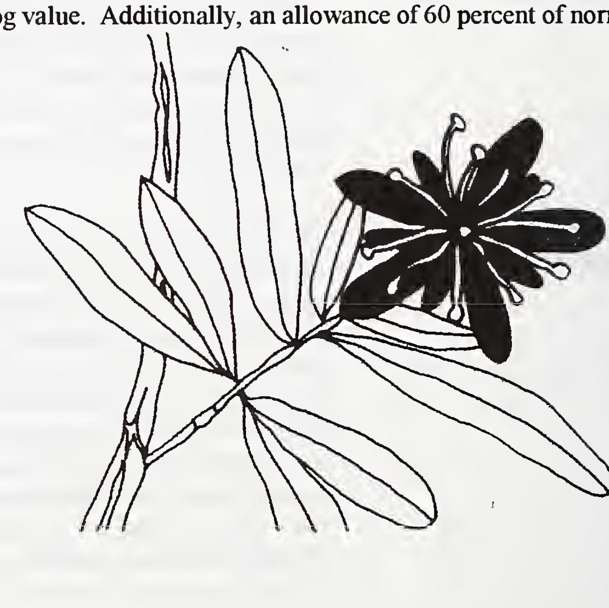
Determining the economic efficiency of each timber sale offering is an important step in the Forest Service planning process. Forest Service policy and handbook direction (FSH 2409.18) requires an economic efficiency assessment to compare benefits and costs of each proposed timber sale project and to determine if the sale would be a positive economic offering. This economic efficiency analysis is performed by comparing expected gross revenues to estimated costs and arriving at an estimate of future net revenues.

Pond log values represent the delivered price of logs at the mill minus the cost to manufacture them into usable products. Pond log values were determined based on the mid-market value, which is a weighted median of historic quarterly pond log values. This is done to account for fluctuations in market prices. However, because recent market trends have resulted in significant fluctuations of timber prices, a high-end rate reflecting recent prices was also used in the assessment. Thus, the historic market value represented by the mid-market appraisal will be used to represent the low range of the timber market. A pond log value calculated in 1995 during a higher peak in timber demand will represent the high market value in the following information.

Logging, or stump to truck costs, vary by volume class (indices of the average quantity of timber per acre) mainly due to the size of the logs yarded. In general, the higher the volume per acre, the larger the logs; thus, the logging costs per MBF are lower. Species composition is an important variable to consider when estimating timber value. Logging costs in this analysis are equivalent to all stump to truck cost centers used in the Region 10 appraisal process to harvest timber. Therefore, logging costs include timber falling, bucking, yarding, sorting, and loading. As part of the analysis, the assumption of an operator of average efficiency is used to appraise timber sales.

The economic efficiency assessment for the Final EIS used the appraisal process employed in the Draft and Supplemental Draft EIS by adjusting acres, volumes, and miles for each alternative. New numbers were extrapolated where applicable and relationships of earlier alternatives carried forward.

Stumpage value indicates Forest Service minimum receipts from timber sold. For this assessment, stumpage value was calculated by subtracting estimated logging, transportation, and road construction costs from the pond log value. Additionally, an allowance of 60 percent of normal



profit and risk was also included as a cost and subtracted from pond log values per Forest Service Handbook 2409.18. The stumpage value does not include bid premiums that would result from competitive bidding for the timber when sold. It should also be noted that chip (or other value added products) values have not been added into the pond log values. In an actual appraisal, each timber sale would add an appropriate chip value to the value per MBF. Recent appraisals have indicated this value is about $200/MBF.

Table 4-23 displays the results of the economic efficiency assessment for the action alternatives. The assessment indicates that all the action alternatives would produce negative stumpage values using low-market prices; however, using high market timber prices, all of the stumpage values would be positive. Alternative 12 has the lowest stumpage values and Alternative 11 has the highest.

Table 4-23
Economic Efficiency Assessment

	Alt. 10	Alt. 11	Alt. 12	Alt 13.
Total Volume (MBF)	24,641	71,168	85,572	60,646
Pond Log Value Per MBF (Low Market)1/,4/	$300.80	$298.84	$296.17	$298.84
Pond Log Value Per MBF (High Market)1/,4/	$521.00	$521.00	$521.00	$521.00
Logging Costs Per MBF	$184.99	$207.74	$203.62	$212.44
Transportation Costs Per MBF	$ 69.92	$ 69.11	$69.48	$69.11
Road Costs Per MBF	$142.23	$145.63	$162.07	$127.40
Direct Costs Per MBF2/	$397.14	$422.48	$435.17	$408.95
60% Profit Margin Per MBF	$48.03	$47.72	$47.85	$47.72
Net Stumpage Value3/ Per MBF (Low Market)	($144.37)	($171.36)	($186.85)	($157.83)
Net Stumpage Value3/ Per MBF (High Market)	$75.83	$50.80	$37.98	$64.33

1/ Pond log values: Low market is based on the mid-market appraisal used in the Supplemental DEIS; high market is based on 1st quarter 1995 values and average Forest-wide species composition.

2/ Direct costs = Total logging costs and total transportation.

3/ Net stumpage value = Pond log value - total direct costs - 60% profit margin.

4/ Does not include chip values (approximately $200/MBF).

Prior to the time each sale is offered, each unit and road will be cruised by the Forest Service to accurately determine the quantity, quality, and value of timber. A formal appraisal and timber sale report will be prepared incorporating current quarter selling values and cost information plus a normal profit and risk margin using the assumption of an operation of average efficiency. Site-specific environmental investments, for example, reforestation of yellow cedar by hand planting in clearcut units, will be included in KV sale area improvement plans, timber sale appraisals, and contracts. The purpose of this appraisal is to establish a framework in which a minimum acceptable selling value can be established.

The Supplemental Draft EIS included displays of the economic efficiency assessment broken down by geographic area. The relationships displayed there are still valid.

The economic efficiency assessment indicates all alternatives could be sold in higher market conditions and that each alternative would have parts or sales that may not be able to be sold in lower market conditions. Partial cutting prescriptions, helicopter logging, and areas with high development costs create the economic risk.

Partial cutting prescriptions can reduce the economic efficiency of the yarding operations by increasing the yarding costs and reducing the overall volume (stumpage) available to pay for the cost of the operations. Partial cutting is used throughout all alternatives.

Helicopter logging is used to harvest areas that cannot be economically roaded, or cannot be roaded because of unacceptable effects on resources such as soil and water protection. Some stands of timber with heavy partial cutting prescriptions require a helicopter to yard because conventional systems cannot implement the prescriptions and meet the stand resource objectives. Areas in sensitive visual areas are examples. Each alternative has a high proportion of helicopter logging prescribed. Alternative 13 includes the highest percentage with about 35 percent of its volume in helicopter yarding with Alternatives 11, 12, and 10 at 33, 31, and 29 percent, respectively. Helicopter volume can be added to conventional volume to make an alternative more economical. However, in low market conditions this may not help.

High development cost areas include geographic areas where more roads are needed to access units and where the expected volume of harvest is relatively low. The Elevenmile area is an example of this because of the long distance of new road needed to access timber coupled with timber volumes which are relatively low in this naturally fragmented forest area. This area is included in Alternatives 11 and 12. The Kogish area has much steep ground with a high amount of riparian management area that needs to be protected. The relatively long distance of new road to access this area may make it difficult to sell in low market conditions. Alternatives 10, 11, 12, and 13 include some or all of the units in the Kogish area. Similarly, the upper Steelhead Creek area will require substantial riparian management areas which in turn reduce the potential volume needed to pay for new road construction. This area is at risk of being able to be sold conventionally. Helicopter yarding of some of the volume is being considered but, as discussed above, this could be subject to market conditions also.

Variances in volume per acre, species mix, logging systems, log-haul distance, road construction and reconstruction costs, camp mobilization costs, and profit and risk allowances affect both the pond log values and logging, transportation, and construction costs. Costs and revenues used in the assessment represent averages for each sale area. Although individual units, or even entire sales, may not be economical to harvest by themselves, the management of less productive lands or lands containing a high percentage of defective timber will help to increase future timber yields. The harvest of units with higher returns will help compensate for those that are less economical.

Public Investment Analysis

Public investment analysis of the timber harvest alternatives incorporates the concept of the time value of money or PNV. Present-day costs and management expenses are subtracted from net stumpage revenues (stumpage receipts obtained from the economic efficiency analysis). These costs and management expenses include planning, sale preparation, harvest administration, reforestation, timber standard improvement, general and program administration, facilities depreciation, and regional land line location. These costs are distributed on a per acre basis. Use of this method allows for comparison of harvest efficiency as it rewards maximization of harvest volume or efficiency in conjunction with minimization of acreage disturbance. Therefore, public investment analysis allows Forest Service administrators to make valid economic comparisons among alternatives. The use of PNVs allows for the derivation of the harvest efficiency of an alternative. The use of PNVs is useful in identifying the minimum acceptable return on investment for the four alternatives. Table 4-24 presents the results of a preliminary PNV analysis for the alternatives. The PNVs are all similar.

Table 4-24
Public Investment Summary

	Alt. 10	Alt. 11	Alt. 12	Alt. 13
Forest Service Revenues				
Volume (MBF)	25,641	71,168	85,572	60,646
Net Stumpage Value[1/] Per MBF (High market)	$75.83	$50.80	$37.98	$64.33
Total Value	$1,944,357	$3,615,334	$3,250,025	$3,901,357
Forest Service Fixed Costs				
Acres	964	2,980	3,769	2,577
Forest Service Pre-Harvest Costs (per acre)[2/]	$1,554.20	$1,554.20	$1,554.20	$1,554.20
Forest Service Pre-Harvest Costs	$1,498,249	$4,631,516	$5,857,780	$4,005,173
Present Net Value (PNV)	$446,108	$1,016,182	($2,607,755)	($103,816)

1/ High market is based on 1st quarter 1995 values and average Forest-wide species composition.

2/ Forest Service costs include sale preparation, timber planning, silvicultural exams, harvest administration, general and program administration, facilities depreciation, and regional land line location. They are based on the Timber Sale Program Information Reporting System (TSPIRS) for Fiscal Year 1994 for the Ketchikan Area.

It is important to remember that public investment analysis is based on the assumption that estimated revenues for an alternative will actually occur. It must be noted that PNVs shown include potential timber sales at risk economically. They also do not reflect fluctuations in market conditions, or competitive bidding, or changes in pond log value due to increased value of products such as chips, finger jointed lumber, etc.

To accurately predict PNVs and avoid overstating the level of benefits or revenue associated with each alternative, economic analysis must incorporate risk or the probability that certain events or outcomes will occur. The degree of risk is a function of a historical loss or falldown associated with similar projects. For example, the estimated biological yield for a fully stocked timber stand reforested following initial harvest may never be realized due to future losses from insects, disease, or shifts in species composition. Adjustment must be made to factor in these risks and falldown. Additionally, the net revenues from harvesting existing timber stands are expected to be less than the returns from future harvests. This conclusion is based on the assumption that a large portion of the costs incurred today will provide infrastructure improvements to support future timber harvests.

Socioeconomic Analysis

As part of a long-term cooperative effort among the Federal government, the State of Alaska, and local municipalities to provide greater economic diversity in Southeast Alaska, the Tongass Timber Management Program was developed. Timber harvested in National Forests is subject to domestic processing requirements. Therefore, most of the jobs provided by the timber industry in the region are linked to timber supplies from the Tongass. Maintaining timber supply opportunities for the region's timber industry was an important objective of both the TTRA and ANILCA. Employment in the industry in Southeast Alaska increased by 30 percent between Fiscal Year 1981 and Fiscal Year 1990 (ANILCA 706(a) Report to Congress, Region 10 USDA Forest Service, 1990).

However, the maintenance of ANILCA's timber employment objectives is dependent on other factors. Interest rates, production and shipping costs, regional competition, private and public harvest levels, foreign exchange rates, and the overall Pacific Rim demand for wood fiber also affect employment levels in the timber industry.

Types of Socioeconomic Effects

Under all project alternatives except for the No Action Alternative, the regional economy will be stimulated as a result of project related expenditures, payroll expenditures, and related indirect and induced spending, or "multiplier effects." In assessing the economic impacts of the project, it is important to recognize that because of methodology, regional economic impacts associated with this project are measured as if they take place in one phase. However, reality dictates that these impacts actually take place along two primary phases. The initial phase of the project is likely to result in a higher level of expenditures, primarily for infrastructure upgrades such as roads. These higher expenditures are likely to result in a temporary increase in the level of local economic activity. However, since these expenditures are by nature short-term, their impact on the regional economy will be limited. Economic activity generated during the second phase of the project, the routine harvesting of designated areas, will continue throughout the life of the project. Therefore, while from a public investment perspective, initial project outlays result in higher Forest Service costs and therefore, a lower PNV, from a socioeconomic perspective these additional expenditures may result in a higher infusion of cash into the local economy, creating additional demand and thus creating an increased level of local economic activity.

Long-term economic impacts may further affect the demographic characteristics of the area, with resultant minor impacts on the local housing market and various community services.

Methodology

Multipliers generated by the Forest Service's economic model, IMPLAN, were used to provide estimates of levels of employment and income which would be supported by each of the proposed timber harvest alternatives within the Control Lake Project Area. The economic effect of any alternative is composed of primary or direct effects, and secondary or indirect and induced effects. Direct effects are measured primarily as increases in employment and income within the wood product industry (including harvesting, construction, logging, transportation, processing, and sawmill operations) resulting from any changes in production levels. This methodology is based on the assumption that any increase in production is in response to an increase in market demand. Indirect and induced effects, here on to be referred to as indirect effects, are an economic by-product of increased expenditures (increased demand) for goods and services on the part of industries directly involved in timber harvesting, as well as the additional wage earners employed in timber harvesting and production. For example, sawmills require electricity, mechanical components, and miscellaneous supplies to meet the demand for lumber. Some of these necessities will be purchased locally. The providers of those services and supplies will, in turn, increase their consumption of goods and services, thus creating additional rounds of expenditures. Further economic stimulus is created when wages from the direct and indirect employment effects are spent within the project region. Multipliers generated by IMPLAN capture all rounds of spending and response generated through increases in industrial and individual consumption.

The IMPLAN model, like other regional economic input-output models, serves as a proxy for the actual economic structure of a region. The foremost assumption of an input-output model, such as IMPLAN, is that the production function of local industries remains constant over time. Therefore, the ratio of employment to output is held constant, allowing for derivation of changes in direct employment based on estimates of changes in total industry output. Due to increased efficiency in the timber industry over the past few years, the share of labor as a production input is less. To represent as realistically as possible all potential economic impacts, the IMPLAN model has been adjusted accordingly. It now incorporates employment and output information that is more representative of current industry structure.

A variety of industries comprise what is commonly referred to as the "wood products industry." For purposes of this analysis, a distinction is made between employment attributed to timber harvest and the employment supported by processing of that timber into lumber, cants, and other products. This distinction is important in terms of the timing of employment opportunities and the availability of other sources of wood. For several reasons, the consequences of the proposed activities are more directly reflected in the employment figures corresponding to timber harvest activities rather than those of the processing industries. Although the Project Area is one source of supply for the industry, a number of previously mentioned factors influence the amount of products produced, as well as the potential of additional wood supplies. Finally, employment figures reported here represent a portion of the current work force rather than an absolute increase in employment. Consequently, they are most appropriately used for comparison between alternatives.

Employment and Income Effects

Tables 4-25 and 4-26 list the results derived from the IMPLAN model analysis for each alternative. Employment and income effects for timber harvesting activities are based on the detailed estimates of logging and road construction costs used in the economic efficiency assessment previously discussed. Personal income estimates are based on average industry wages as reported by the timber industry and the Alaska Department of Labor.

Table 4-25
Total Employment and Income Effects on Socioeconomics

	Alt. 10		Alt. 11		Alt. 12		Alt. 13	
	Employment[1/]	Income[2/]	Employment[1/]	Income[2/]	Employment[1/]	Income[2/]	Employment[1/]	Income[2/]
Timber Harvesting								
Logging	79	$2.71	251	$8.62	298	$10.24	221	$7.59
Construction	25	0.96	71	2.74	96	3.70	54	2.08
Marine Transport	2	0.06	4	0.12	5	0.15	3	0.09
Subtotals	106	3.73	326	11.48	399	14.09	278	9.76
Timber Processing								
Sawmills	50	1.82	143	5.18	173	6.28	123	4.45
Subtotals	50	1.82	143	5.18	173	6.28	123	4.45
Totals	156	5.55	469	16.66	572	20.37	401	14.21

Source: Analyses in project planning record.

1/ Employment = Direct Employment (person-years)
2/ Income = Direct Income ($ million)

Table 4-26
Employment Effects and Estimated Return to the State and Ketchikan from Federal Income Taxes Derived from Project-Produced Personal Income

	Alt. 10	Alt. 11	Alt. 12	Alt. 13
Employment Effects				
Direct Jobs	156	469	572	401
Indirect and Induced Jobs	68	205	251	176
Total Jobs	224	674	823	577
Total Personal Income	$7,408,000	$22,263,000	$27,230,000	$19,020,000
Federal Income Tax	$1,408,000	$4,230,000	$5,174,000	$3,614,000
25% Transfer to State from Federal Income Tax (estimated at 5% of total personal income)1/	$370,000	$1,113,000	$1,362,000	$951,000
Payment to Ketchikan (4.5% of total State receipts, estimated)	$16,600	$50,100	$61,300	$42,800

Source: Analyses in project planning record

1/ This percentage of personal income taxes paid to the federal government has been returned on average to the State. This amount does not include the 25 percent of gross federal receipts returned from the Forest Service to the State of Alaska.

These site-specific data were incorporated into the IMPLAN model to calculate the total effect of increased timber-related output in the timber related industries within Southeast Alaska.

Employment opportunities closely parallel the level of timber harvest. A larger timber harvest is accompanied by greater local expenditures. Therefore, Alternative 12 produces the highest employment effects, since local expenditures associated with its implementation are highest among the alternatives. The annual harvest and annual mill production under Alternative 12 would result in the largest employment gains associated with the harvest. Harvest under the scenarios proposed for Alterative 10 would sustain the lowest level of regional employment relative to Alternative 12. As employment is reduced, regional income and economic output would also fall.

Total direct employment supported under the harvest alternatives has been broken down into two major categories, timber harvesting and timber processing. Overall, timber processing is expected to support slightly higher direct employment than timber harvesting.

Under the assumption that implementation of the No Action Alternative would eliminate the proposed harvest volume within the ROI and of the latter employment opportunities, selection of the No Action Alternative could cause a significant impact to the economic base of communities dependent on timber harvesting on Prince of Wales Island and timber processing at the various sawmills.

Fiscal Effects

To help the public better understand timber management, the Forest Service initiated the Timber Sale Program Information Reporting System (TSPIRS), which is intended to improve the way information is developed and displayed. The TSPIRS presents three reports on the National Forest timber program for the year. The three reports are (1) The Financial Report; (2) The Economic Report; and (3) The Employment, Income, and Program Report. The TSPIRS is produced and made available to the public annually.

Although it is not possible to accurately determine timber sale revenues to the Federal government, pond log values net of specified road and logging costs can be used as basis for an approximation. Moreover, it is estimated that 25 percent of gross National Forest receipts go to the State of Alaska and are returned to local areas with distribution based on a percent of the National Forest in an area.

As indicated in Tables 4-26 and 4-27, Alternative 12 is expected to produce the largest receipts to the State of Alaska and the Ketchikan Area while Alternatives 11, 13, and 10 would yield progressively lower receipts. Implementation of the No Action Alternative would result in both negative economic and fiscal impacts. Not only would direct and indirect employment opportunities be eliminated, but tax receipts generated from increased employment would also be eliminated. No new jobs would be created, resulting in the loss of additional tax revenues, and those currently employed in industries directly or indirectly related to timber harvesting and processing could lose their jobs. This would decrease tax receipts and lead to a higher burden on the State for unemployment compensation.

Table 4-27
Estimated Minimal Payments to the State of Alaska

	Alt. 10	Alt. 11	Alt. 12	Alt. 13
Total Volume (MBF)	25,641	71,168	85,572	60,646
Net Stumpage Value[1/] per MBF (High market)	$75.83	$50.80	$37.98	$64.33
Road Construction Costs (per MBF)[2/]	$142.23	$145.63	$162.07	$127.40
Net Stumpage Value + Road Construction Costs (per MBF)	$218.06	$196.43	$200.05	$191.73
Less $0.50/MBF to Treasury[3/]	$217.56	$195.93	$199.55	$191.23
Multiplied by MBF[4/]	$5,578,456	$13,943,946	$17,075,893	$11,597,335
25% to State	$1,394,614	$3,485,987	$4,268,973	$2,899,334

Source: Analyses in project planning record.

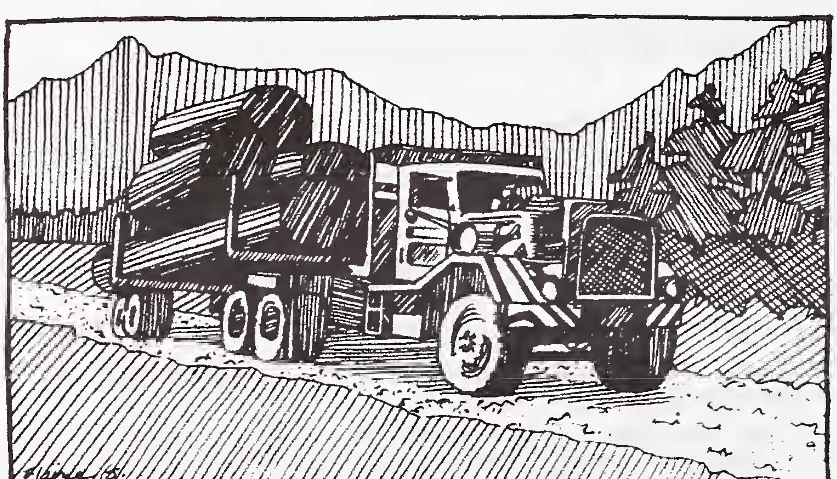
1/ High market value is based on 1st quarter 1995 values and average Forest-wide species composition.
2/ Includes road construction, road reconstruction, and LTF construction costs
3/ $0.50/MBF is the minimum payment to the U.S. Treasury
4/ National Forest Receipts Act payments (25% of net stumpage value plus the value of capital improvements such as purchaser credit for roads, LTFs, and timber stand improvements) to the State of Alaska.

Localized Economic Implications

The predictive capabilities of the IMPLAN model are based on linear relationships. Regardless of the size or direction of change in timber harvest levels, the model assumes that the regional economy is expected to respond in a strictly proportional manner. In reality, this straight-line relationship may not hold, and some industries may be forced to shut down completely if production is significantly reduced. The extensive capital investment in a mill represents a fixed cost that cannot be altered in the short run. To remain economically viable, the plant must run continuously at a reasonable operating level to cover fixed and variable costs. Conversely, if large increases in demand occur, an industry may expand operations with additional capital investment to purchase more efficient technology. New technology usually requires only a limited increase in employment. So the estimates of employment and income derived from IMPLAN must be interpreted with regard to the scale and operating capacity of industries within the ROI.

The same logic applies to the assessment of economic impacts to the communities of Prince of Wales Island, Ketchikan, and other Southeast Alaska communities. Implementation of Alternatives 11, 12, or 13 represent a continuation of ongoing economic activity. Therefore, they would be expected to result in the previously cited economic and fiscal benefits, and not alter ongoing local and regional expenditure patterns. Implementation of the No Action Alternative or Alternative 10 may have adverse economic impacts on the regional economy. Implementation of these alternatives may result in adverse impacts on various communities on Prince of Wales Island, primarily those that provide an alternative source for some goods and services.

Many have commented on making more sales available to small operators. Alternatives 11, 12, and 13 provide more sale opportunities than Alternative 10. This is primarily because the larger alternatives include more potential harvest units in areas that are already developed. For example, units 578-401, 403, 404, 577-416, 417, 418, 423, 431, 432, 591-405, 407, 409, and several units in VCU 597.2 could be sold in combinations or as individual units that would be attractive to smaller operators. Another benefit to the long-term small timber sale program from the larger alternatives is extension of the road system that would make more timber more easily available in the future.



Community Stability and Lifestyles

In addition to changes in employment and income, implementation of each of the alternatives will affect other elements of community and individual stability and lifestyles. Elements associated with community and individual stability in this context, reflect the visual and recreational value of the Project Area and surrounding region, wildlife habitat, and subsistence resources. The 1997 Forest Plan Revision addressed these opportunities and issues in its Land Use Designations. Discussions of the respective impacts on these resources are presented in corresponding sections of this document.

Community stability is a very important consideration in planning for timber harvest activities on the Tongass National Forest. In addition to values described in preceding discussions (e.g., employment, income, tax receipts), a balance between natural and human resource activities is important to the communities of Southeast Alaska. Many of the residents of Southeast Alaska derive their livelihood from the timber industry or benefit from the economic development the timber industry has brought to their communities.

Implementation of the No Action Alternative may result in substantial cutbacks in the industry's production. The corresponding decrease in timber harvesting and processing employment and income would negatively affect community stability.

Implementation of Alternatives 10, 11, 12, or 13 would maintain different levels of timber harvesting through the Control Lake Project implementation period. All alternatives would disperse management activities and tend to bring those areas that have not yet been developed under active timber management within the Project Area.

Sectoral Economic Effects

Commercial Fishing Industry

As noted in the Fisheries and Watershed Resource Report (Rogers and Ablow, 1995), no measurable effects on fisheries resources are expected under the action alternatives because habitat is protected as required to meet the standards and guidelines of the TLMP, TTRA, and NFMA. Therefore, implementation of any of the alternatives would not affect the commercial fishing industry.

Recreation and Tourism Industry

Future employment in the recreation and tourism industries, including employment related to sport hunting and fishing, is projected to change at the same rate as future use. Projected future recreational use demand in Southeast Alaska during the 1990s is expected to increase by 27 percent for recreation and tourism, 36 percent for sport fishing, and 53 percent for hunting (USDA Forest Service, 1990). Projected future increases in recreation and tourism related employment in Southeast Alaska are expected to correspond to increases in recreation demand. None of the alternatives are expected to significantly affect or be affected by this regional trend.

Jobs and earnings related to expenditures made by deer hunters and salmon anglers are widely dispersed across Southeast Alaska. Hunters and anglers use towns within the Economic Region of Influence to replenish their groceries, gasoline and other supplies. However, most expenditures for equipment and initial supplies are made in their home communities. Similarly, the employment and personal income generated by other recreational users of the Control Lake Project Area are dispersed across Southeast Alaska and throughout a variety of economic sectors. These people include individual recreationists, outfitter-guides and their clients, and tourists viewing the Project Area from cruise boats or from the Alaska Marine Highway ferry system.

Gill net commercial fishing

Because of the estimated low relative level of recreational activity that takes place in the Control Lake Project Area, and because the alternatives would not significantly affect many recreation places and sites, no significant impact is expected on employment and income opportunities in the recreation and tourism industry under the No Action Alternative or any of the action alternatives. Implementation of any of the action alternatives may result in the displacement of some recreational users who seek more primitive experiences to areas outside the Project Area. This displacement would be a result of recreationists seeking specific primitive or semi-primitive recreational opportunities that might no longer be available in the area of active timber harvest or road construction. As more areas are harvested for timber, displaced recreationists seeking primitive or semiprimitive recreational opportunities would find it increasingly difficult to find places to recreate on the northern part of Prince of Wales Island. Implementation of any of the action alternatives may increase the level of recreation users to the project area who are seeking a more developed recreation opportunity or who like or need easier access. These recreationists will find it easier to find places to recreate on Prince of Wales Island.

Cumulative Effects

The cumulative effects of each of the alternatives on the economic and social environment are difficult to estimate. A wide variety of factors affect employment and income levels, tax receipts, demographic characteristics, lifestyles, and community stability within the Southeast Alaska region. The cumulative effects associated with the proposed timber harvesting alternatives in the Control Lake Project Area on the reasonably foreseeable and longer-term future of Prince of Wales Island and its surrounding area are expected to take place along two primary aspects.

The first aspect relates to the economic and social benefits of continued harvesting of the proposed volume on Prince of Wales Island. From the standpoint of employment, personal income, population, community services, and some aspects of community stability, there is substantial benefit from maintaining long-term timber harvest in the contract area. The receipts generated, including revenue to the U.S. Treasury, payments to the State of Alaska, State and local taxes, and dollars brought into the community, all represent an economic benefit from continued timber activity.

The 1997 Forest Plan Revision resulted in ASQ reductions from 540 MMBF in the 1979 Plan to 267 MMBF. Based on the timber supply analysis, suitable timber in the Control Lake Project Area could contribute 35 to 75 MMBF per decade for the next five decades, not including second growth.

The second aspect of a long-term timber harvest that needs to be addressed is the alteration of the natural environment when roads are constructed and timber is harvested (i.e., the impact of locational differences of timber cutting within Prince of Wales Island). Much of the economic and social value of Southeast Alaska is dependent on its natural setting. The 1997 Forest Plan Revision has allocated approximately 50 percent of the old growth areas in the North Central Prince of Wales Province to LUDs that will be managed for natural settings. The recreation and tourism industry is based primarily on the natural setting and visual resources of the region. TLMP designation of the Hatchery Creek/Thorne River System as Scenic and Recreation River LUD, Elevenmile and Western Peninsula area as Semi-Remote Recreation, the main road to Thorne Bay as a scenic corridor and collectively over 50,000 acres of old growth protection should limit impacts on the recreation and tourism industry in the Control Lake Project Area.

The balance necessary to maintain a viable, robust economic and social environment is established at a National or Regional level, rather than at a project level. Cumulative economic and social effects of the proposed alternative actions in the Control Lake Project Area must ultimately be assessed in context with coinciding local, regional, and national economic and social developments. Based on regional standards and guidelines, the action alternatives have been constructed to minimize the negative cumulative effects on the economics and community values of the core communities when considering the total resource.

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Subsistence

Key Terms

Alaska National Interest Lands Conservation Act (ANILCA)—requires evaluations of subsistence impacts before changing the use of certain Federal lands.
Birds—includes ducks (e.g., mallards, widgeons, teals, shovelers, old squaws, golden eyes, and buffleheads), seabirds and seaducks (e.g., scoters, murres, murrelets, puffins, seagulls, and cormorants), Canada geese, seabird eggs, and other birds.
Finfish or fish—includes cod, halibut, flounder, sole, flatfish, rock fish, herring, eulachon, hooligan, Dolly Varden, steelhead, trout, and other fish (excluding salmon).
Invertebrates or shellfish—includes king crab, dungeness crab, tanner crab, shrimp, sea cucumber, sea urchins, abalone, octopus, scallops, gumboot, clams and cockles, other invertebrates, and herring eggs.
Land mammals—includes deer, moose, goat, black bear, wolf, small game, and furbearers (i.e., marten and land otter).
Marine mammals—harbor seal and other marine mammals.
Non-rural—a community with more than 7,000 people; does not qualify for priority use of subsistence resources. Ketchikan and Juneau in Southeast Alaska have been determined to be non-rural by the Federal Subsistence Board.
Plants—includes beach greens, mushrooms, roots, seaweed/kelp, and berries.
Rural—all Southeast Alaska communities other than Juneau and Ketchikan; residents qualify for priority use of subsistence resources.
Salmon—includes chinook (king), sockeye (reds), coho (silver), pink (humpback), and chum (dog).
Subsistence—customary and traditional uses by rural Alaskans of wild renewable resources.
Wildlife Analysis Area (WAA)—a division of land designated by Alaska Department of Fish and Game and used by the Forest Service for wildlife analysis.

Introduction

Section 810 of ANILCA (Public Law 96-487) requires a Federal agency having jurisdiction over lands in Alaska to evaluate the potential effects of proposed land use activities on subsistence uses and needs. Section 810 (a) of ANILCA states:

In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the Federal agency having primary jurisdiction over such lands or his designee shall evaluate the effects of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such Federal agency

1. gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to [ANILCA] Section 805;

2. gives notice of, and holds, a hearing in the vicinity of the area involved; and

3. determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands; (B) the proposed

> activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition; and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such action.

This section evaluates how the proposed action alternatives could affect subsistence resources used by the rural communities in the Control Lake Project Area and vicinity. The subsistence resource categories evaluated are deer, black bear, furbearers, salmon, other finfish, shellfish, other food resources, and firewood.

Evaluation Criteria

Criteria used to evaluate the effects of the proposed alternatives are: (1) changes in abundance or distribution of subsistence resources, (2) changes in access to subsistence resources, and (3) changes in competition from nonsubsistence users for those resources. The evaluation determines whether subsistence opportunities in the Project Area or portions of the Project Area may be significantly restricted by any of the proposed action alternatives. To determine this, the evaluation: (1) considers the availability of subsistence resources in the surrounding areas; (2) considers the cumulative impacts of past, present, and foreseeable future activities on subsistence users and resources; (3) looks at potential cultural and socioeconomic implications affecting subsistence users; and (4) focuses on the mapped subsistence use in the Project Area. The evaluation relies heavily upon the use of the 1997 Forest Plan Revision conservation biology assessment, strategy, standards and guidelines, scientific panel assessment, and selected wildlife habitat capability models as well as upon ADF&G hunter survey data.

This subsistence evaluation considers, with distinct findings by alternative and by resource category, whether or not there is a significant possibility of a significant restriction of subsistence use. The Alaska Land Use Council's definition of "significant restriction of subsistence use" is one guideline used in the findings. By this definition:

> A proposed action shall be considered to significantly restrict subsistence uses, if after any modification warranted by consideration of alternatives, conditions, or stipulations, it can be expected to result in a substantial reduction in the opportunity to continue subsistence uses of renewable resources. Reductions in the opportunity to continue subsistence uses generally are caused by: reductions in abundance of, or major redistribution of resources; substantial interference with access; or major increases in the use of those resources by non-rural residents. The responsible line officer must be sensitive to localized, individual restrictions created by any action and make his/her decision after a reasonable analysis of the information available.

The U.S. District Court Decision of Record in *Kunaknana v. Watt* provided additional definitions of "significant restriction of subsistence uses" and are also used as guidelines in the findings. The definitions from *Kunaknana v. Watt* include:

> Significant restrictions are differentiated from insignificant restrictions by a process assessing whether the action undertaken shall have no or slight effect as opposed to large or substantial effects. In further explanation the Director (BLM) states that no significant restriction results when there would be "no or slight" reduction in the abundance of harvestable resources and no occasional redistribution of these resources. There would be no effect (slight inconvenience) on the ability of harvesters to reach and use active subsistence harvesting site; and there would be no substantial increase in competition for harvestable resources (that is, no substantial increase in hunting by non-rural residents).

Conversely, restrictions for subsistence uses would be significant if there were large reductions in abundance or major redistribution of these resources, substantial interference with harvestable access to active subsistence-use sites or major increases in non-rural resident hunting. In light of this definition, the finding of significant restriction must be made on a reasonable basis, because it must be decided in light of the total subsistence lands and resources that are available to individuals in surrounding areas living a subsistence lifestyle. The EIS evaluates the availability of subsistence resources in surrounding areas that could be accessed without undue risk or economic hardship to subsistence users.

Most of the data in this section are analyzed by WAA, management units delineated by the ADF&G and used by the Forest Service. None of the WAAs are completely located within the Project Area. WAA 1323 is almost entirely within the Project Area; WAA 1319 is about three-fourths in the Project Area; and WAAs 1318 and 1421 are one-half and one-third, respectively.

Habitat capabilities and harvest numbers reported here are based on the entire WAA (including State and private lands), whereas in the *Wildlife* section, they are based only on the portion of the WAA within the Project Area. This section analyzes habitat capability on an entire WAA basis to facilitate comparisons to animal harvest, which are available from ADF&G records on a WAA basis. It is important to note that there are substantial differences between the two sets of habitat capability numbers.

In order to account for increases in harvest demand over time, observed harvest levels are increased for harvest projections based on Alaska State population projections (1991). An average increase of 1.8 percent per year is used through 2010 and 1.5 percent per year is used thereafter.

Direct, Indirect, and Cumulative Impacts on Subsistence Use of Deer

Specific areas within the Control Lake Project Area are more important than others for harvesting subsistence resources. Figures 3-27 through 3-32 depict Control Lake subsistence use areas developed from the TRUCS database (Kruse and Muth, 1990). Only rural communities were surveyed by TRUCS; therefore, use of the Project Area by Ketchikan residents is not depicted. The deer harvest maps depict areas where less than 1, 1-5, 5-15, and greater than 15 percent of households in one or more communities have ever harvested deer.

The greatest deer harvest is concentrated along the major road systems of the Project Area. Within the Project Area, the extent and location of the subsistence use area precludes complete avoidance. Areas other than subsistence use areas that could be harvested are limited by other resource concerns such as soil and water protection, high value wildlife habitat, economics, visuals, or unit and road design. Effort was made to protect the highest value subsistence areas. For example, beach fringe is one of the highest use subsistence areas, and none would be harvested under any of the proposed alternatives.

Abundance and Distribution

Determining what harvest levels are sustainable assumes that habitat capability projections from the deer harvest model reflect an approximation of future deer populations if a major population reduction were to occur (i.e., major winter kill). As noted in Chapter 3, model “outputs” were often expressed in species population numbers, giving the misleading impression that actual numbers of individuals were being indicated. Population numbers can vary widely from year to year as a result of many factors other than habitat capability. The model was never intended to represent population models that consider fecundity, mortality, population age structure, etc. and often incorporate an element of ‘random’ environmental events that can affect populations.

Although estimated habitat capabilities do not accurately reflect populations, they are the only measure available of the future populations. It also assumes that the distribution of deer harvest across a WAA is approximately proportional to the available habitat. Furthermore, it is based on the determination that the sustainable harvest is 10 percent of the deer population (Flynn and Suring, 1989). The analysis assumes that the 1987 to 1991 mean deer harvest reflects rural and non-rural community use of deer in Project Area WAAs. ADF&G has collected deer harvest data for individual WAAs since 1987. Averaging the deer harvest makes allowance for factors that influence deer numbers and hunting activity from year to year, such as weather patterns, access, habitat capability, and hunting success.

Non-rural residents harvested an average of 922 deer or 23 percent of the deer taken from the Project Area WAAs, while rural residents harvested an average of 3,069 deer or 77 percent during 1988 to 1991 (Table 3-19). Based on the assumptions described above, Table 4-28 presents the estimated Project Area deer harvest in 1995 and compares them to habitat capabilities calculated for existing conditions and under the action alternatives. This table indicates that the estimated 1995 habitat capability may be below the level that can sustain the projected harvest levels on a continuing basis in Project Area WAAs.

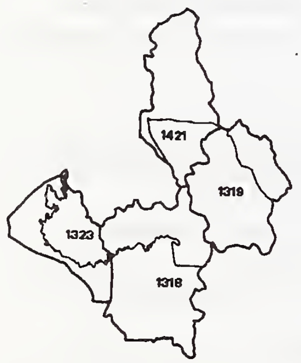

Table 4-28

Project Area WAA Deer Harvest in 1995 Compared to 1995 Habitat Capability and the Change in Habitat Capability after Project Implementation

	1995 Harvest[1/]			Total Percent Change in Habitat Capability After Implementation				
WAA	Rural Residents	All Hunters	1995 Habitat Capability[2/]	Alt. 1	Alt. 10	Alt. 11	Alt. 12	Alt. 13
1318	353	391	1,747					
1319	268	330	2,615					
1323	105	139	1,470					
1421	115	231	2,609					
Total	841	1,091	8,441	0	0.2	0.8	1.2	0.6

Source: Thornton 1992. Data derived from ADF&G Deer harvest Survey Summary Statistics 1987-1991 and Forest Service, Ketchikan Area, database.

1/ Estimates are based on the entire WAA, including portions outside the Project Area. They are based on predicted 1995 harvest levels using observed 1988-91 harvest levels, which are increased 1.8% per year.

2/ Habitat capabilities are for the entire WAA, including portions outside the Project Area and are based on Table 3-112 of the USDA Forest Service (1997).

Deer harvest levels in 1995 are about 13 percent of predicted habitat capabilities. Harvest by rural residents is about 10 percent. A deer population at carrying capacity should be able to support a hunter harvest of approximately 10 percent that is both sustainable and provides a reasonably high level of hunter success relative to effort. At 20 percent, the hunter success rate may decrease and, if the population is at carrying capacity, 20 percent may approach a rate that is not sustainable.

After implementation of one of the action alternatives, estimated habitat capabilities for the four Project Area WAAs would be lowered from about 0.2 to 1.2 percent. This slight change is not expected to have a significant effect on the ability of Project Area WAAs to support hunter harvest.

Access

Access to traditional subsistence use areas may be affected where logging activities (including road construction) take place near the beach fringe because traditional subsistence access includes use by boats on the beaches in the Elevenmile area. Alternatives 10 and 13 would not allow harvest or road construction within 5 miles of the beach fringe in the Elevenmile area. Harvest activities under Alternative 11 would occur about 3 miles from the beach; Alternative 12 harvest and road construction would be within 1 mile of the beach in this area. However, all roads in this area would be closed after harvest activities are completed.

New and rebuilt roads would provide access to areas that were not previously used for subsistence harvest of deer. Miles of road proposed for construction are provided in Table 4-22. Table 4-16 shows road density and open road density after construction. New access would be greatest for Alternative 12 and least for Alternatives 10, 13, and 11. Road access would favor harvest by residents who live in communities connected to the road system and use vehicles for hunting or who bring a vehicle to Prince of Wales Island on the ferry. Road access details are presented in the *Transportation and Facilities* section.

Competition

Competition for subsistence resources in the Control Lake Project Area is an issue for residents of Prince of Wales Island. Residents are concerned about competition from residents of Ketchikan, mostly because of the numbers of people that come to Prince of Wales via the ferry. Because Ketchikan residents are considered non-rural, this competition can be regulated if it starts to restrict rural residents' ability to obtain subsistence resources.

Proposals have been made to develop an alternative ferry service with a ferry terminal in Coffman Cove. If this happens, additional competition can be expected.

Table 3-19 shows the distribution of deer harvest in Project Area WAAs among rural and non-rural communities. Data indicate there is competition with non-rural hunters at least in WAAs 1318 and 1319 because the population needed to support the total harvest exceeds the habitat capability by 33 to 44 percent. Overall, deer habitat capability in all WAAs currently and within the foreseeable future is close to the level needed to sustain rural and non-rural subsistence harvest (Table 4-28).

As noted in the wildlife section, wolves depend on deer as a primary prey source. This would have to be factored into overall demand on deer.

The Federal Subsistence Board may use its authority to regulate non-rural harvest of deer and has authority to prioritize the harvest of deer among rural residents when necessary to protect the resource. This type of action, as prescribed by ANILCA, Section 804, may be necessary to ensure the availability of adequate abundance of deer needed by the rural communities using the Project Area whether or not the proposed actions are implemented.

Deer populations vary from year to year. As long as a major population-reducing event does not occur, populations are likely to remain above the predicted habitat capabilities as estimated by the model. This seems to be where deer populations are now and have been for some time.

Restrictions are determined on an annual basis by the Board, and to date no restrictions have been applied on Prince of Wales Island. In recent years, in fact, the Board has allowed antlerless deer to be harvested.

Individual household use of specific areas may be displaced by some of the proposed actions. There is not sufficient information available to evaluate displacement potential for individual households, nor would it be practical. With one major exception, the Project Area's accessibility makes it very unlikely that an individual household or even an entire community is highly dependent on specific areas within the Project Area that may be affected by proposed alternatives. The exception is the use of the Western Peninsula area by Klawock residents. A long history of subsistence use of this area by Klawock residents using boat access has occurred. Some alternatives may negatively affect this long-term use pattern. The known uses of the Project Area by individual communities are discussed in Chapter 3.

The evaluation indicates that deer abundance may be inadequate to both meet subsistence and non-subsistence demand within the area historically used by residents of each community. Any displacement that may occur is likely to be to other areas within a household's or community's historical range. Furthermore, any displacement that may occur would likely be temporary until activities within the Project Area conclude in 3 to 5 years.

Cumulative Effects

Refer to the cumulative effects section for wildlife. The TLMP (1997) Final EIS presents a discussion of subsistence cumulative effects and is incorporated by reference (pages 3-226 and 3-227).

Community Analysis

The Supplemental Draft EIS includes additional information on deer harvest areas. The timber harvest numbers have changed since the Supplemental Draft EIS, but the relationships are still similar but with lower effects because timber harvest acres have been reduced in all alternatives.

Direct, Indirect, and Cumulative Impacts on Subsistence Use of Other Resources

Abundance and Distribution

Black Bear

Black bear are generally not a major food source (Kruse and Muth, 1990) and the majority of documented harvest from Project Area WAAs (63 percent) are taken by non-resident hunters. A limited number of local hunters take black bears for food, and black bear parts are used for other cultural purposes, as well. The total current black bear harvest level may be near the maximum level that is sustainable in the Project Area (see Supplemental Draft EIS).

Roads left open to vehicle access for bear hunting following timber harvest may increase hunting success. However, the access management plan associated with the action alternatives would result in a net reduction of open roads. No timber harvest is proposed within beach and estuary fringe habitats or riparian management areas. Changes in local black bear distribution would occur in the vicinity of ongoing timber harvest activities during the life of the proposed project. Bears tend to move back into these areas after timber harvest is completed.

Furbearers

Furbearers are currently being trapped in the Project Area. Current harvest rates may be near the maximum level that is sustainable in the Project Area (see Supplemental Draft EIS).

This suggests that there may already be significant competition for marten within the Project Area, with much of that competition coming from non-rural communities outside of the Project Area. The proposed timber harvest for Control Lake would slightly reduce marten habitat capability for the WAAs in the Project Area. Roads left open for public use during trapping season may further decrease marten populations. However, the Project access management plan would result in a net decrease in open roads within the Project Area, potentially resulting in a decrease in trapping pressure.

River otter habitat is protected by TLMP LUDs and standards and guidelines. No change is expected for otters.

Salmon

Salmon are a major subsistence food harvested in the Control Lake Project Area. The *Watersheds and Fisheries* section concludes that potential effects of the proposed timber harvest and road construction alternatives on salmon spawning and rearing habitat would be minimal or eliminated by applying the Forest Service standards, guidelines, and prescriptions described in detail in the Aquatic Habitat Management Handbook (USDA Forest Service, 1986b) and Soil and Water Conservation Handbook (USDA Forest Service, 1991b). All salmon spawning and rearing streams (Class I and Class II streams) near proposed timber harvest units are protected by buffers of at least 100 feet as prescribed in the TTRA. In addition, specific prescriptions for protecting salmon habitat were incorporated during the design of harvest and roads.

Based on the implementation of site-specific prescriptions for protecting salmon spawning and rearing habitat, the immediate and foreseeable effects on the abundance and distribution of salmon for subsistence uses in the Project Area would not be measurable.

Other Finfish

The action alternatives for the proposed project would have no immediate or foreseeable effect on other finfish habitat. Because there would be no effect on other finfish habitat, the abundance and distribution of those other finfish would not be affected.

Shellfish

Based on the limited impact that existing LTF sites have on marine and estuarine habitat, crabs, and benthic organisms, the effect of this project on the abundance and distribution of local crabs, clams, and other shellfish would not be measurable for purposes of subsistence. No new LTFs would be developed under any of the action alternatives. The project would not have any additional impacts on shellfish for the foreseeable future.

The Western Peninsula area of WAA 1323 is perceived, especially by Klawock residents, as a cultural resource, as much as or more than an area of natural resources. This perception is embedded in the complex of subsistence activities that are conducted there, and the wide range of subsistence resources collected and harvested in that area, including shellfish. None of the action alternatives would negatively affect the cultural experience associated with shellfish harvest in this area.

Other Food Resources

Other foods include plants such as kelp, goose tongue, and a variety of berries. Most traditional gathering of these foods occurs near beach and estuarine areas. None of the alternatives infringe upon beach areas potentially used for other food gathering. Road construction activities would improve access to berry picking sites that are now not reasonably accessible, in the short-term, but open road miles would decrease over the long-term.

Because beach fringe and estuaries would not be significantly affected by the proposed timber harvest, the Project's activities and foreseeable impacts are not expected to substantially affect the abundance and distribution of other foods.

Firewood/Personal Use Wood

The Forest Service has a free-use policy (with limits) for firewood and timber and none of the proposed alternatives would have an adverse effect on the availability of firewood, personal-use timber, and traditional uses of wood, such as for totem poles.

Access

Access to traditional subsistence use areas may be affected where logging activities are located along existing roads or near the beach fringe. This is because traditional subsistence access is by motorized vehicle or by boat to the beaches of the Project Area (Ellanna and Sherrod, 1987). The effect on access would probably be minor under Alternatives 10, 11, and 13 because harvest activities would be about 3 or more miles from the beach in the Elevenmile area and no marine and estuarine habitat would be affected by logging activities. Under Alternative 12, harvest activity would occur within 1 mile of the beach in this area, increasing the likelihood of conflicts.

New and rebuilt roads would provide motorized vehicle access to areas that were not previously used for subsistence harvesting resources. Road access would favor harvest by residents who live in communities connected to the road system or who bring a vehicle to Prince of Wales Island on the ferry. Road closures and other management prescriptions developed for Project Area roads take subsistence uses into consideration.

Competition

Competition for subsistence resources in the Control Lake Project Area is an issue to residents of Prince of Wales Island. Residents are concerned with competition from residents of Ketchikan, mostly because of the numbers of people that come to the island via the ferry. Subsistence resources most likely to be affected by competition from Ketchikan residents include deer, bear, and marten. Because Ketchikan residents are considered non-rural, this competition could be regulated if it starts to restrict non-rural residents' ability to obtain subsistence resources.

There is no evidence to indicate that availability of salmon, finfish, shellfish, or other food resources to subsistence users would be affected by sport or non-rural harvest. Any increase in competition from non-rural residents and Alaska nonresidents would not be substantial because of the availability of resources in the immediate vicinity and in the surrounding areas.

Individual household use of specific areas may be displaced by some of the proposed actions. There is not sufficient information available nor would it be practical to evaluate displacement potential for individual households. With one major exception, the Project Area's accessibility makes it very unlikely that an individual household or even an entire community is highly dependent on specific areas within the Project Area that may be affected by proposed actions. Generally, there are sufficient lands available elsewhere within or outside the Project Area and within the home range of the communities for subsistence gathering. The exception is the use of the Western Peninsula area by Klawock residents. A long history of subsistence use of this area by Klawock residents using boat access has occurred. The action alternatives are not expected to negatively affect this long-term use pattern. The known uses of the Project Area by individual communities are discussed earlier in this section.

Cumulative Effects

Refer to the cumulative effects section for wildlife. The TLMP (1997) Final EIS presents a discussion of subsistence cumulative effects and is incorporated by reference.

Summary Findings for Deer and Other Resources

The above analysis leads to the conclusion that the actions proposed in Alternatives 10, 11, 12, and 13, would not produce a significant possibility of a significant restriction on subsistence use of river otter, salmon, other finfish, or other resources. However, a significant possibility of a significant restriction is possible for deer, black bear, and marten under all alternatives, if non-rural harvesting is not restricted (Table 4-29). This finding is based on the potential resource effects on three evaluation categories: abundance or distribution, access, and competition.

Other Conclusions

Section 810 (a) (3) of ANILCA (P.L. 96-487, 1980) requires that when a significant restriction may occur, determinations must be made in regard to whether:

1. Such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of public lands;
2. The proposed activity will involve the minimum amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition; and
3. Reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.

The following section outlines the other subsistence conclusions.

Table 4-29
Possibility of a Significant Restriction of Subsistence Use of Deer and Other Resources after Project Implementation for All Alternatives

	Deer	Black Bear	Marten	River Otter	Fish/ Shellfish	Others
Abundance or Disturbance	May	May	May	No	No	No
Access	No	No	No	No	No	No
Competition	May	May	May	No	No	No

Note: "No" indicates an insignificant possibility of a substantial effect. "Yes" indicates a significant possibility of a substantial effect. "May" indicates there may be a significant possibility of a substantial effect in the future.

Necessary, Consistent with Sound Management of Public Land

The alternatives proposed in this Final Environmental Impact Statement have been examined to determine whether they are necessary, consistent with sound management principles for the utilization of public lands. In this regard, the National Forest Management Act of 1976, the Alaska National Interest Lands Conservation Act, the Tongass Timber Reform Act, the Alaska Regional Guide, the Tongass Land Management Plan, the Alaska State Forest Resources and Practices Act, and the Alaska Coastal Zone Management Program have been considered.

Management activities on the National Forest must provide for the multiple-use and sustained yield of renewable forest resources in accordance with the Multiple-Use Sustained Yield Act of 1960. Multiple-use is defined as "the management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people" (36 CFR 219.3). The alternatives presented in the Final EIS represent different ways of managing the Control Lake Project Area resources in combinations that are intended to meet the needs of the American people. Each provides a different mix of resource uses and opportunities, and each has some potential to affect subsistence uses. Given the framework and emphasis of each alternative, the potential restrictions associated with each alternative are necessary, consistent with sound management of public lands.

ANILCA placed an emphasis on the maintenance of subsistence resources and life-styles. However, the Act also emphasized providing for adequate opportunity for satisfaction of the economic and social needs of the State of Alaska and its people, and recognized public lands necessary and appropriate for more intensive uses. The Act also required the Forest Service to make available for harvest 4.5 billion board feet of timber per decade from the Tongass National Forest. The TTRA removed the 4.5 billion board foot requirement from ANILCA, but directed the Forest Service to seek to meet market demand for timber to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, and subject to applicable law.

The proposed alternatives are necessary as a component of the timber management program designed to implement the Forest Plan and meet TTRA direction. There is currently a limited timber supply from other sources, and an under-utilized mill capacity in the region. The alternatives provide volume to contribute to the Forest Service's actions to seek to meet market demand while providing adequately and reasonably for other resources and uses. This volume can serve as a component of the ten year timber sale schedule which attempts to provide timber to industry in an even timber flow over the planning cycle. The timber volume is also a substantial component of the timber sale program to be offered in the next five years on the Ketchikan Area to seek to meet annual market demand. Timber volume from other areas of the Tongass National Forest is not likely to be available to replace this volume in a reasonable time frame. The action alternatives provide various options that can help meet the objectives of the Forest Plan and TTRA for timber harvests while also providing reasonable protection measures for forest resources, especially for subsistence. They are consistent with the Forest Plan, laws, regulations, policies, public needs, and the capabilities of the land.

Amount of Land Necessary to Accomplish the Purpose of the Activity

The amount of public land necessary to implement the alternatives are, considering sound multiple use management of public lands, the minimum necessary to accomplish the purpose of that alternative. The entire forested portion of the Project Area is used by several rural communities for subsistence purposes for deer hunting and possibly other uses. It is not possible to avoid all of these areas in implementing resource use activities such as timber harvesting and road construction under any alternative and attempting to reduce effects in some areas can mean increasing the use of others.

Forest Plan: Many of the decisions to minimize the amount of public land were made as part of the Forest Plan. The Forest Plan allocated many of the important subsistence use areas to Land Use Designations (LUDs) which are not suitable for timber harvest. For the Control Lake Project Area, 55 percent of the total acres and approximately 2/3 of the existing old growth were allocated to LUDs which do not allow timber harvest. Such areas included the Eleven Mile, Honker Divide, Rio Roberts, Log Jam, and Election Creek areas. In addition, Forest Plan standards and guidelines removed additional acres which are important for subsistence from the suitable land base including 1,000-foot buffers around the beach and all estuaries as well as specific riparian buffers along all Class I, II, and III streams to protect fish habitat and water quality. The remaining acres in the Control Lake Project Area were selected to become part of the timber sale schedule because it is designated as a multiple use area that permits timber harvest in the Forest Plan including the Timber Production, Modified Landscape and Scenic Viewshed. These designations provide for resource use and development for commodity resources such as timber.

Each alternative provides a sound location and design for all harvest units and roads. Given the framework and emphasis of the alternative, the minimum amount of land and roading was used to resolve resource concerns while meeting the purpose and need for the project in a practical and efficient manner and the framework of this alternative.

Reasonable Steps to Minimize Adverse Impacts Upon Subsistence Uses and Resources

Considerable steps were taken in the Forest Plan to minimize the impacts to subsistence use and resources. Most areas of high value are beach fringe and stream buffers which are the areas of traditional use. In the Control Lake Project Area, the Western Peninsula and the associated Elevenmile shore represent the highest current and historic subsistence use area. The Forest Plan Semi-Remote Recreation LUD will minimize adverse impacts on subsistence uses in the Elevenmile and Western Peninsula area. The overall Forest Plan LUD strategy, alternatives to clearcutting, road access management strategy, and other measures represent reasonable steps to minimize adverse impacts to subsistence resources.

Each alternative framework reflects a reasonable balance between projected need for Tongass timber from the Project Area to help meet TLMP, ANILCA, and TTRA timber-related objectives, and continued protection of subsistence uses and resources.

Impacts on subsistence have been minimized through the development of the individual harvest units and road corridors, and through the formulation of the alternatives.

The Final EIS describes the mitigation measures that will be implemented as a part of each alternative. Most of the mitigation measures are designed to maintain fish and wildlife habitat productivity at the highest level possible, while still producing a supply of timber.

EIS Conclusions

The ROD for the Control Lake Project will include a final determination about the significant restriction on subsistence use that may result from implementation of the selected alternative. In summary, the potential foreseeable effects from the action alternatives in the Control Lake Project Area do not present a significant possibility of a significant restriction of subsistence uses of river otter, marine mammals, waterfowl, salmon, other finfish, shellfish, and other foods. However, a significant possibility of a significant restriction may exist for deer, marten, and black bear.

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Cultural Resources

> ***Key Terms***
>
> ***Cultural resources***—all evidence of past human-related activity. It may be historic, prehistoric, architectural, or archived in nature. Cultural resources are nonrenewable aspects of our national heritage.
> ***Sensitivity zone***—defined as "high," "medium," or "low," based on the probability that they might contain cultural resources.
> ***SHPO***—State Historic Preservation Officer.

Introduction

Documentation of cultural resources, with preservation and protection of National Register eligible resources, is a general Forest Service objective for such undertakings as the current Project. Where avoidance and *in situ* preservation are not viable management options, then measures are implemented to recover data as a way of mitigating effects to significant cultural resource properties.

Direct and Indirect Effects

Direct impacts to cultural resources may result from activities such as road building, logging or construction of log transfer facilities. While natural processes, such as erosion and redeposition, can also adversely affect cultural resources, such processes can be accelerated as a result of logging-related activities. Indirect impacts to resources, such as increased access to an area or change in stream flow or sediment loads, may result from logging or road building.

Intensive cultural resource inventory of areas that have a high probability of containing cultural resources is an important means of protecting these resources. The current project initially focused inventory in proposed cutting units and along proposed roads in high probability areas. No new cultural resource properties were located during the intensive inventory of about 1,140 acres inventoried in or adjacent to harvest units or road corridors. As inventory of the proposed harvest units and roads neared completion, 720 acres were surveyed along rivers and around lakes in the Thorne River/Hatchery Creek scenic/recreational area. No cultural resource properties were located in this area.

An additional 1,350 acres of Forest Service administered and State of Alaska lands were surveyed in a continuous swath along or near the shoreline from Point Swift on Nossuk Bay in the north to the boundary with Native Corporation lands in the south. Inventory along the coast resulted in relocation and evaluation of 13 known properties and the location and evaluation of 28 previously unrecorded properties. In addition, many Culturally Modified Trees (CMTs) were located, none of which are considered significant resources warranting avoidance or further data collection.

During the Control Lake EIS Project cultural resources inventory, cultural resource personnel intensively surveyed approximately 3,210 acres, while approximately 335 acres were reviewed at the reconnaissance level by field personnel. While none of the properties has been specifically identified as a traditional cultural/religious location, reported use of the area by Tlingit people from Klawock and Craig may include currently undocumented traditional cultural practices.

The following statements summarize presumed effects on known, significant cultural resource properties of logging and road construction being considered as part of the various alternatives. This data is also summarized in Table 4-30.

Table 4-30
Number of Known Cultural Resource Properties Potentially Affected by Alternative

	Alternative				
Cultural Resource Properties Impacts	1	10	11	12	13
Direct Impacts	0	0	0	0	0
Risk of Indirect Impacts	0	0	0	0	0

Alternative 1

No action taken will result in no effect to cultural resources.

Alternatives 10, 11, 12, and 13

No actions will occur at or close to known cultural resource sites. Several properties recommended as eligible for listing in the National Register that could be affected by the proposed project are located on the west coast of Prince of Wales Island, more than 1 mile from proposed harvest units. Given the distance of the properties from harvest units and the current standards and guidelines, development is expected to result in no impact.

The preferred management approach for cultural resource properties by the Forest Service and other agencies is avoidance. Logging operators should be urged to avoid any increase of human activity in the coastal area. To address avoidance and preservation concerns, Forest Service personnel should monitor the area during logging activities. If disturbance occurs or is imminent, then the Forest Archaeologist will develop a plan to protect properties or mitigate the effects of any impacts.

In the unlikely event that avoidance is not feasible or practicable during project implementation, mitigation of impacts to the properties through data recovery plans will need to be undertaken. Data recovery plans will be based on the qualities that make the properties eligible for the National Register.

In cases where development is planned in areas of high cultural resource site probability or in the vicinity of known cultural resources, the Forest Service should develop and implement a plan for monitoring known, significant resources and monitoring for previously unknown properties. If the monitoring program documents effects to properties then measures should be developed to mitigate those effects and if new properties are exposed, they should be recorded and evaluated for National Register eligibility.

Cumulative Effects

Impacts from natural decay, landscape changes, private developments, and timber management activities collectively result in the loss of nonrenewable cultural resources in Southeast Alaska. Development activities of all kinds pose particular threats to cultural resources because such activities tend to be located in the same places that cultural resources are found, such as sheltered coastal settings.

It is impossible to determine the exact nature of resources that may have been previously disturbed in the Control Lake Project Area. Intensive cultural resource investigations and mitigation measures have been implemented only since the 1980s. The implementation of updated research and survey designs based upon the results of previous work and current methods and techniques, combined with various mitigation measures will preserve significant properties and provide data that will guide future research and management activities. In addition, current management approaches for Beach Fringe/Estuary and Riparian Protection (1997 TLMP Revision) should also benefit cultural resources through decreased activity in high probability areas and reduced indirect effects such as sedimentation of resources.

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Visual

Key Terms

Background—the distant part of a landscape; the seen, or viewed area located from 3 to 5 miles to infinity from the viewer.

Character type—an area of land that has common distinguishing visual characteristics of landform, rock formations, water forms and vegetative patterns.

Characteristic landscape—usually a small portion of a character type that visually represents the basic vegetative patterns, landforms, rock formations and water forms which are in view.

Cumulative visual disturbance—the percent of a viewshed's seen area in a disturbed condition at any point in time.

Distance zone—divisions of a viewed landscape by foreground, middleground, and background zones.

Foreground—portion of viewed area from immediately adjacent to the viewing position to about a half mile from the observer's position; individual branches of trees are discernible.

Maximum Modification—a visual quality objective (VQO) which prescribes that an area may be dominated by management activities, but resulting visual characteristics should appear as a natural occurrence when viewed from the background distance zone.

Middleground—the visible terrain beyond the foreground from about 1/4 mile to 3 to 5 miles from the observer's position; individual trees are still visible but do not stand out distinctly from the landscape.

Modification—a VQO in which management activities may visually dominate the original characteristic landscape, but resulting visual characteristics must resemble natural occurrences within the surrounding area when viewed from the foreground and middleground distance zone.

Not seen—a mapping category associated with distance zones. Sensitivity Level 3 travel routes, use areas, and areas not seen or seldom seen from Visual Priority Routes and Use Areas have been mapped as Not Seen in the visual inventory. Also referred to as "Seldom Seen."

Partial Retention—a VQO in which management activities are to remain visually subordinate to the natural landscape.

Preservation—a VQO which permits ecological changes only; applies to wilderness areas and other special classified areas.

Retention—a visual quality objective which provides for management activities that are not visually evident to the casual observer.

Sensitivity level—a three-level measure of people's concern for the scenic quality of an area.

Unacceptable Modification—does not meet a VQO of Maximum Modification. Excessive modification due to management activities in which the design, size, extent, or duration are poorly related to the scale of landform and vegetative patterns in the characteristic landscape may result in unacceptable modification.

Variety class—classification of the landscape by the diversity and scenic quality of the natural landscape. The three classes are: Class A - Distinctive; Class B - Common; Class C - Minimal.

Viewshed—a defined landscape or panoramic vista seen from one or more specific viewpoints.

Visual Absorption Capacity (VAC)—an estimate of the relative ability of a landscape to absorb alteration yet retain its visual integrity.

Visual priority routes and use areas—the designated priority routes and use areas from which the proposed VQOs will be applied. Nonpriority travel routes and use areas, and those areas not seen from the Visual Priority Routes and Use Areas, are managed according to "Not Seen" criteria.

Visual Quality Objective (VQO)—management standards reflecting five degrees of acceptable alteration of the natural landscape based on a landscape's diversity of natural features and the public's concern for scenic quality.

4 Environmental Consequences

Introduction

Timber harvest activities have the potential to change the form, line, color, and texture of the natural landscape. In this section the potential visual contrasts created by proposed harvest alternatives are related to the affected environment that was described in Chapter 3. Effects are analyzed for each Priority Travel Route and Use Area. The ability of proposed units to meet adopted VQOs and potential changes in visual condition are discussed for each of these viewsheds.

The extent of visual contrast created by timber harvest is influenced by unit design, silvicultural prescription, harvest method, and the transportation system. Manipulation and monitoring of these factors as described in this section, helped to mitigate visual contrast. One such mitigation measure is "patch cutting." This technique of visual screening was applied to several units of high visual concern.

Effects of Alternatives

The following discussion evaluates the visual effects of Alternatives 10, 11, 12, and 13 on Priority Travel Route and Use Areas. Viewsheds for each priority area affected by the alternatives are graphically depicted in Figure 3-23. Because no harvest activity is proposed within their viewsheds, there would be no measurable visual effects on the following Priority Travel Routes and Use Areas:

- Communities of Craig and Klawock
- Cutthroat Lakes
- Thorne River Bridge
- Gravelly Creek Day Use Area
- Community of Thorne Bay

Located more than 5 miles west of the Control Lake Project Area is the Maurelle Island Wilderness Area. Appearing as a background element, texture is virtually nonexistent in visible portions of this continuously forested landscape. Atmospheric attenuation further obscures the detection of texture and color. While several harvest units are located in areas visible from the Maurelle Islands, they are not expected to be apparent to the casual forest visitor.

One or more alternatives contain harvest units and associated roadways that would affect visual resources, as seen from the following Priority Travel Routes and Use Areas:

- West Coast Waterway
- Waters around Craig and Klawock
- Control Lake Cabin Site
- Eagle's Nest Campground (Balls Lake)
- Thorne River/Honker Divide Canoe Route
- Forest Highway #9

The effects of Alternatives 10, 11, 12, and 13 on Visual Priority Travel Route and Use Area viewsheds are summarized in Table 4-31 and described in detail below.

West Coast Waterway

Alternative 10

One unit (594-420) would be harvested within the West Coast Waterway Viewshed. Harvest of this 91-acre unit would comply with the adopted Maximum Modification VQO and would change the visual condition in its vicinity from natural (EVC 1) to moderately altered (FVC 4).

Table 4-31

Summary of Proposed Harvest Units Located Within Priority Travel Route and Use Area Viewsheds

Viewshed	VCU	Unit	Alternatives 10	11	12	13	LUD[1/]	Zone	VQO[3/]	EVC	Note
West Coast	591	407		+	+	+	TP	MG	MM	1	
Waterway		409		+	+	+	TP	MG	MM	1	
	593	410		+	+		TP	MG	MM	1	
		420			+		TP	MG	MM	1	
		421			+		TP	MG	MM	1	
		431		+	+		TP	MG	MM	1	Group Selection
	594	409		+	+	+	TP	BG	MM	1	
		416		+	+	+	TP	BG	MM	1	
		418		+	+	+	TP	BG	MM	1	Helicopter
		420	+	+	+	+	TP	BG	MM	1	
Waters Around	594	405		+	+	+	ML	MG	M	1	
Craig and Klawock	595	402		+	+	+	SV	MG	PR	1	Group Selection
		406	+	+	+	+	TP	MG	MM	1	
		411		+	+	+	ML	MG	M	1	
		434		+	+	+	SV	MG	PR	1	
Control Lake	595	409	+	+	+	+	SV	MG	PR	1	
Cabin Site	596	406		+	+	+	SV	MG	PR	1	Group Selection
Eagle's Nest	596	406		+	+	+	SV	MG	PR	1	Group Selection
Campground		407		+	+	+	SV	MG	PR	1	Group Selection
Thorne River/Honker Divide	575	420		+	+	+	SV	MG	PR	1	Group Selection
		424		+	+	+	SV	MG	PR	1	Group Selection
Canoe Route		425		+	+	+	SV	MG	PR	1	Group Selection
Forest Highway #9/30 Road	595	407	+	+	+	+	SV	FG	PR	5	ML LUD Intent.
		408	+	+	+	+	ML	MG	M	1	
		409	+	+	+	+	SV	MG	PR	1	
		414	+	+	+	+	ML	MG	M	5	
		419	+	+	+	+	ML	MG	M	5	
	596	406		+	+	+	SV	MG	PR	1	Group Selection
		407		+	+	+	SV	MG	PR	1	Group Selection
		409		+	+		ML	MG	M	1	
	597.2	421		+	+	+	ML	MG	M	5	
		422	+	+	+	+	ML	FG	PR	1	
		424			+		ML	FG	PR	1	
		425			+		ML	FG	PR	1	
		458	+	+	+	+	ML	MG	M	1	

Source: Bedross, 1997

1/TP = Timber Production; SV = Scenic Viewshed; ML = Modified Landscape.

2/ FG = Foreground; MG = Middleground; BG = Background.

3/ R = Retention; PR = Partial Retention; M = Modification; MM = Maximum Modification.

Alternative 11

Eight units would be harvested within the viewshed. Units 591-407 and 409 would be visible as middleground landscape elements in the vicinity of Salt Lake Bay and Nossuk Bay. Both units are less than 10 acres in size and easily comply with the adopted Maximum Modification VQO. In fact, the casual forest visitor would likely not detect these activities. The area associated with these units would be changed from natural (EVC 1) to natural appearing (EVC 2).

Units 593-410 and 431 would be seen in the middleground by boaters in the San Christoval Channel, as could the road leading to 593-431. This activity would comply with the adopted Maximum Modification VQO, while changing the visual condition from natural (EVC 1) to slightly altered (FVC 3).

Lastly, four units would be visually apparent as background landscape elements from the San Christoval Channel. Ranging between 43 and 91 acres in size, units 594-409, 416, 418, and 420 would meet the adopted Maximum Modification VQO and change the visual condition in their vicinity from natural (EVC 1) to moderately altered (FVC 4).

Alternative 12

This Alternative would harvest ten units within the West Coast Waterway viewshed. Units 591-407 and 409 would be visible in the middleground from Salt Lake Bay and Nossuk Bay. Both units are less than 10 acres in size and easily comply with the adopted Maximum Modification VQO. The area associated with these units would be changed from natural (EVC 1) to natural appearing (EVC 2). The casual forest visitor would likely not detect these activities.

Units 593-410, 420, 421, and 431 would be seen in the middleground by boaters in the San Christoval Channel, as would the road leading to 593-431. These units range in size from 27 to nearly 61 acres. The adopted Maximum Modification VQO would be achieved and the visual condition changed from natural (EVC 1) to heavily altered (FVC 5).

Finally, four units would be seen in the background from the San Christoval Channel. Ranging between 43 and 91 acres in size, units 594-409, 416, 418, and 420 would meet the adopted Maximum Modification VQO and change the visual condition from natural (EVC 1) to moderately altered (FVC 4). The southern one-half of 594-409 and all of 594-417 would be harvested by group-selection, leaving large quantities of natural color and texture. Unit 594-418 would be clearcut, but unmerchantable timber and snags left standing.

Alternative 13

Six units would be harvested within the viewshed. Units 591-407 and 409 would be visible as middleground landscape elements in the vicinity of Salt Lake Bay and Nossuk Bay. Both units are less than 10 acres in size and easily comply with the adopted Maximum Modification VQO. In fact, the casual forest visitor would likely not detect these activities. The area associated with these units would be changed from natural (EVC 1) to natural appearing (EVC 2).

Lastly, four units would be visually apparent as background landscape elements from the San Christoval Channel. Ranging between 43 and 91 acres in size, units 594-409, 416, 418, and 420 would meet the adopted Maximum Modification VQO and change the visual condition in their vicinity from natural (EVC 1) to moderately altered (FVC 4).

Waters Around Craig and Klawock

Alternative 10

This Alternative includes harvest of unit 595-406, which would be seen in the middleground distance zone to boaters using Shinaku Inlet, Klawock Inlet, and Big Salt Lake. This activity would comply with the Maximum Modification VQO and would change the visual condition in its vicinity from natural (EVC 1) to moderately altered (FVC 4).

Alternatives 11, 12, and 13

Five units (594-405; 595-402, 406, 411, and 434) and connecting roadways would appear as middleground elements in the landscape north of Big Salt Lake (Figure 4-2). Unit 595-402 would contain a series of group selection cuts that are helicopter yarded, allowing it to meet its adopted Partial Retention VQO and changing the visual condition from natural (EVC 1) to slightly altered (FVC 3). Residual vegetation throughout unit 595-402 would screen many of the harvested "patches" from the casual Forest visitor. Leave-tree islands in 595-434 would keep this unit subordinate to the natural landscape and allow it to meet the adopted Partial Retention VQO. Units 594-405 and 595-411 would achieve the adopted Modification VQO by appearing as undulating horizontal strips that mimic the landform on which they are situated. Harvesting 594-405 and 595-411 would change the associated visual condition from natural (EVC 1) to moderately altered (FVC 4). Unit 595-406 would easily achieve the adopted Maximum Modification VQO and change the visual condition in its vicinity from natural (EVC 1) to slightly altered (FVC 3).

Control Lake Cabin Site

Alternative 10

The uppermost portion of one unit (595-409) may be visible in the middleground to people looking south from the cabin at Control Lake. Intervening vegetation would screen the bottom of this unit. This unit would comply with the adopted Partial Retention VQO and change the visual condition from natural (EVC 1) to slightly altered (FVC 3) (Figure 4-3).

Alternatives 11, 12, and 13

Two units would be harvested in areas seen from the Forest Service cabin and adjacent lake surface. The uppermost portion of unit 595-409 may be visible to persons looking south from the cabin. The lower portion of this unit would be screened. This unit would meet the adopted Partial Retention VQO and change the visual condition from natural (EVC 1) to slightly altered (FVC 3).

Unit 596-406 would be located on a middleground ridge visible from the lake's surface and south shore. Uneven-aged management and helicopter yarding in the seen area would minimize color and texture contrast with the surrounding landscape and ensure the adopted Partial Retention VQO will be achieved. Most of the harvested "patches" would be screened by residual vegetation. This unit is also within the Eagle's Nest Campground (Balls Lake) Viewshed. As a result of harvesting unit 596-406, the visual condition would change from natural (EVC 1) to natural appearing (FVC 2).

Eagle's Nest Campground (Balls Lake)

Alternative 10

This alternative would have no direct visual effect on the Eagle's Nest Campground (Balls Lake) Viewshed. The visual condition in the area would remain largely natural (FVC 1).

Alternatives 11, 12, and 13

Two units would be harvested within the viewshed. Unit 596-406 would be located on a middleground ridge west of the Balls Lake (Figure 4-4). This area is visible from the campground, boardwalk, and lake surface. The same area is visible from the water surface and south shore of Control Lake. Group selection cutting and helicopter yarding would ensure 596-406

Figure 4-2
View North From South Shore of Big Salt Lake

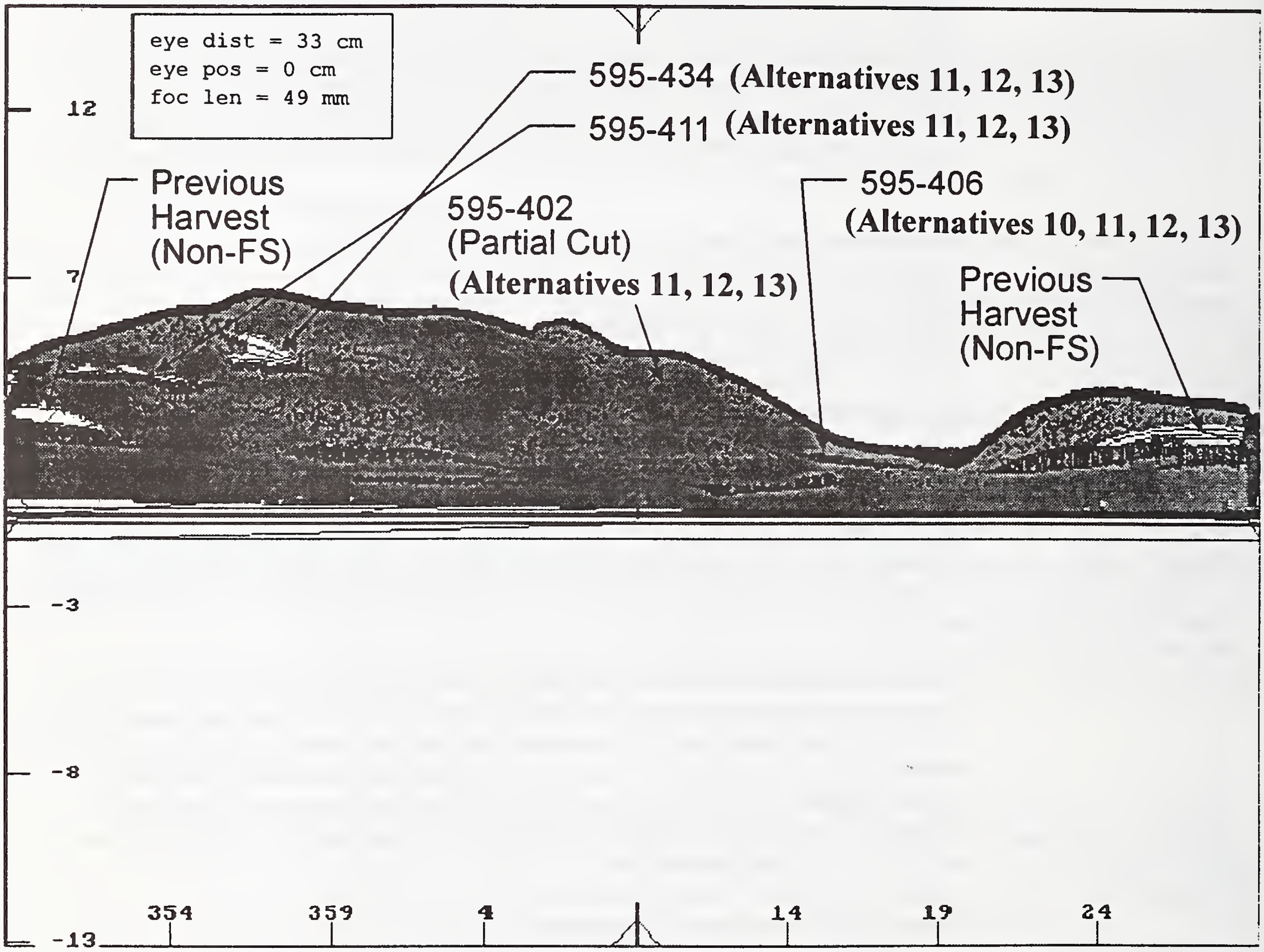
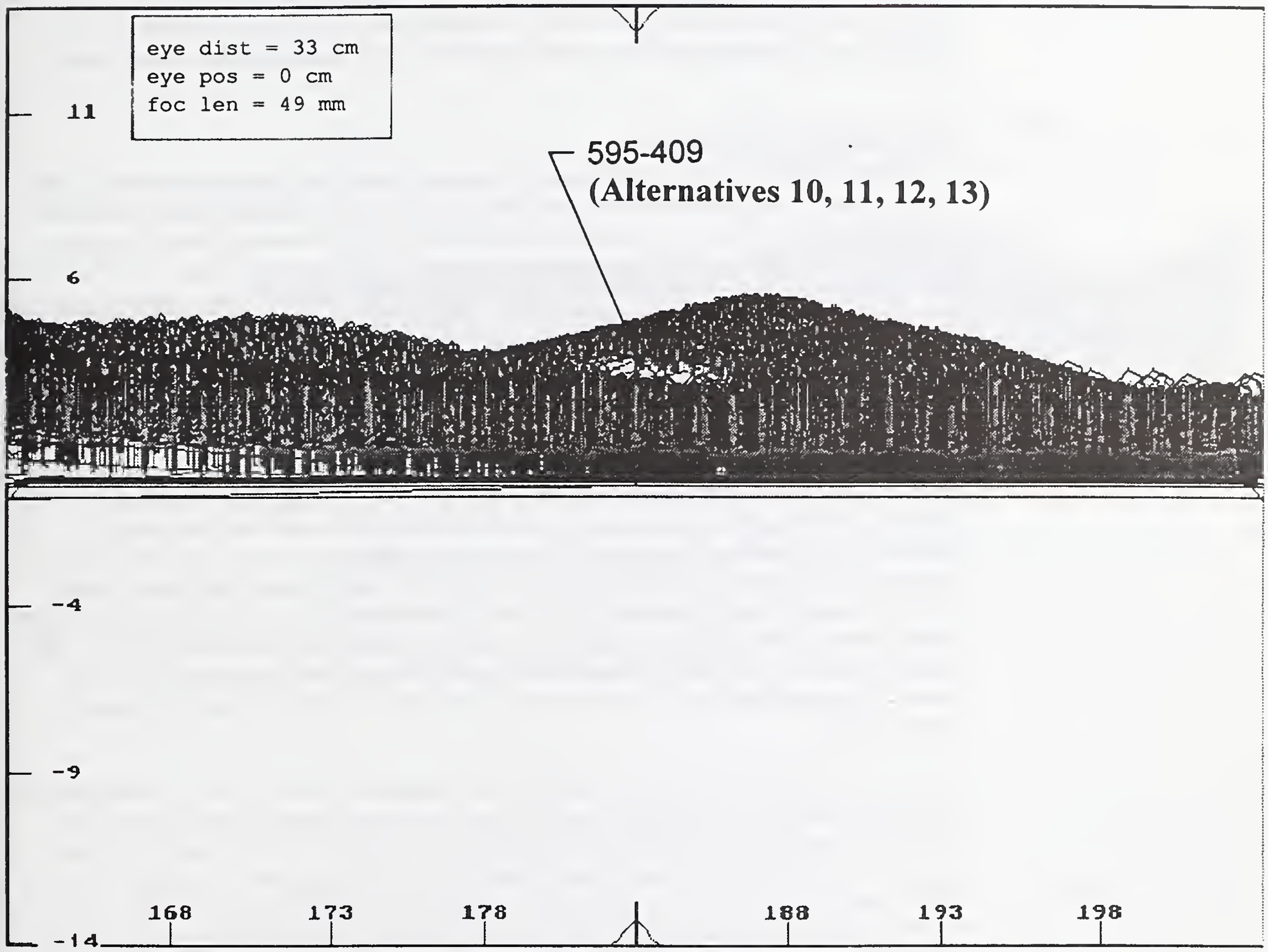


Figure 4-3
View South From Control Lake Cabin



achieves the adopted Partial Retention VQO and change the visual condition for natural (EVC 1) to natural appearing (FVC 2). Most of the harvested "patches" would be screened by residual vegetation.

Unit 596-407 would be located in the middleground just south of unit 596-406. Proposed uneven-aged management and helicopter yarding would ensure that the adopted Partial Retention VQO is achieved. This natural (EVC 1) area would be converted into one that is natural appearing (FVC 2).

Thorne River/Honker Divide Canoe Route

Alternative 10

No units proposed by this alternative would be visible from the Thorne River/Honker Divide Canoe Route. The visual condition within the viewshed would remain predominantly natural (FVC1).

Alternatives 11, 12, and 13

Three units (575-420, 424, and 425) would be harvested east of Twin Lake in the middleground distance zone. All of these units would be partial-cuts and none are expected to be apparent to the casual Forest visitor. As a result, they would easily achieve the adopted Partial Retention VQO, while changing the visual condition from natural (EVC 1) to natural appearing (FVC 2).

Forest Highway #9/30 Road Corridor

Alternative 10

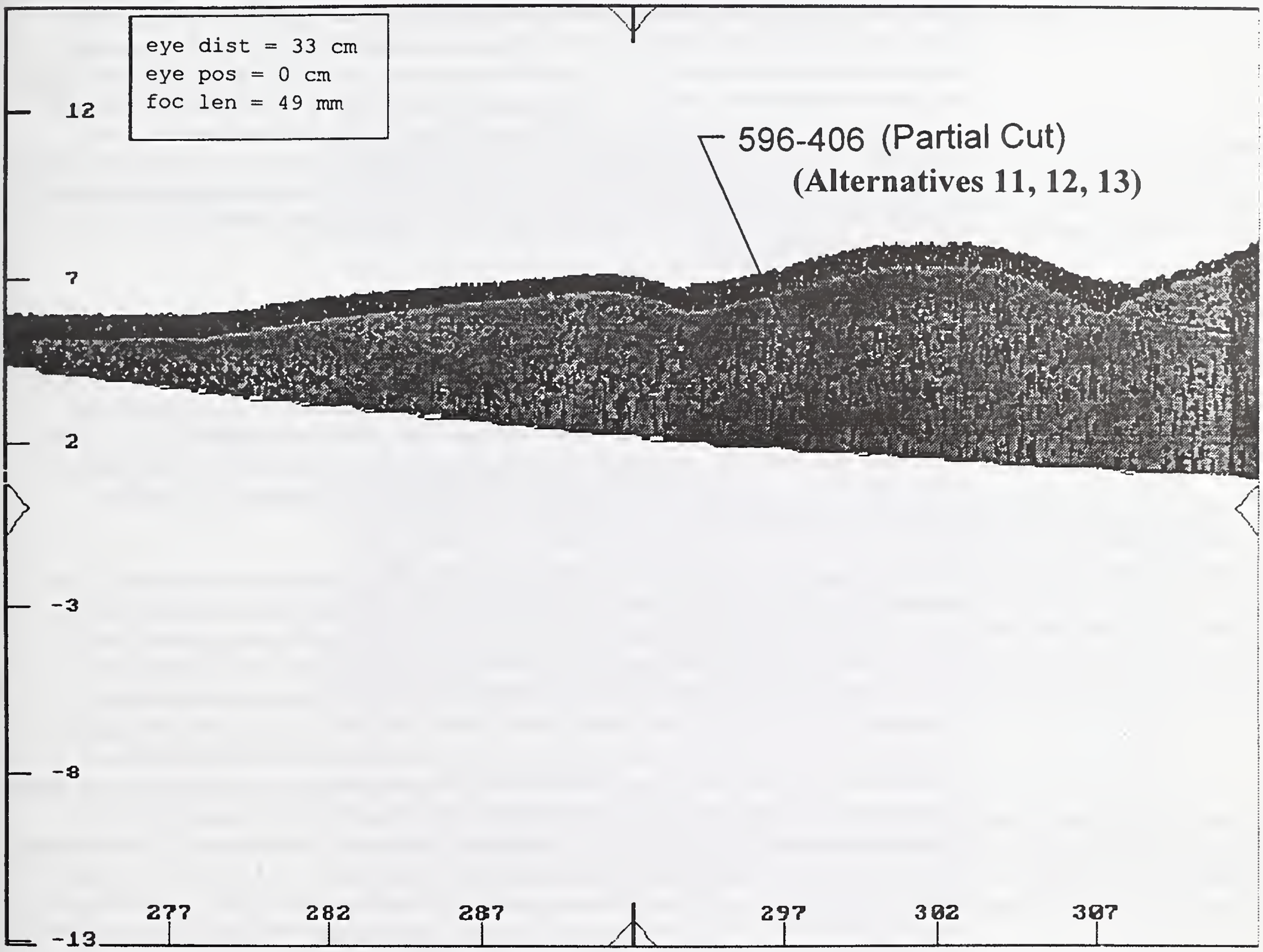
Alternative 10 would harvest seven units within the Forest Highway #9 viewshed, three of which would be in the foreground distance zone. Unit 595-407 would be visible in the foreground south and west of Control Lake. The LUD associated with this unit is Scenic Viewshed, based on potential views from Control Lake and Eagle's Nest Campground (Balls Lake). However, suitable timber harvest lands visible from Forest Highway #9 are intended for inclusion in the Modified Landscape LUD, unless they are also visible from other key viewer locations. Unit 595-407, which would not be seen from Control Lake or Balls Lake, would meet the intended Partial Retention VQO. The visual condition in the vicinity of this unit would remain heavily altered (FVC 5). Also visible near the Thorne River would be 597.2-422. This visually dominant unit would be designed to meet the adopted Partial Retention VQO. The natural visual condition (EVC 1) in the vicinity of 597.2-422 would be changed to slightly altered (FVC 3).

Five units (595-408, 409, 414, 419, and 597.2-458) would be harvested from the middleground of the Forest Highway #9 viewshed. Located south and west of Control Lake, units 595-408, 414, and 419 would meet the adopted Modification VQO. Unit 597.2-458, which is located south and east of Balls Lake, would meet the adopted Modification VQO. Unit 595-409, which is also visible from Control Lake, would achieve the adopted Partial Retention VQO. The visual condition associated with 595-408, 596-409, and 597.2-458 would change from natural (EVC 1) to moderately altered (FVC 4). The area associated with 595-409 would change from natural (EVC 1) to slightly altered (FVC 3). The visual condition in the vicinity of units 595-414 and 419 would remain heavily altered (FVC 5).

Alternative 11

Eleven units would be harvested within the Forest Highway #9 viewshed. Units 595-407 and 597.2-422 would be visible in the foreground. Unit 595-407 would be seen south and west of Control Lake. As described in detail for Alternative 10, it would achieve the adopted Partial Retention VQO and leave the heavily altered visual condition unchanged (FVC 5). Also

Figure 4-4
View Northwest From East Shore of Balls Lake



located near the Thorne River, 597.2-422 would be designed to meet the adopted Partial Retention VQO. Both 597.1-407 and 597.2-422 would change the natural visual condition (EVC 1) in their vicinity to slightly altered (FVC 3).

Nine units would be harvested within the middleground distance zone. Four of these would be harvested to the south and west of Control Lake. Units 595-408, 414, and 419 would all meet the adopted Modification VQO. The visual condition would change from natural (EVC 1) to moderately altered (FVC 4) if 595-408 were harvested. The area surrounding 595-414 and 419 would remain heavily altered (FVC 5) even if these units were harvested. Unit 595-409, which is also seen from Control Lake, would meet the adopted Partial Retention VQO. It would change a natural area (EVC 1) to slightly altered (FVC 3). Three units (596-406, 407, and 409) would be harvested in the middleground near Control Lake and Balls Lake. They would be partial cut and helicopter yarded, meet the adopted Partial Retention VQO, and change the visual condition from natural (EVC 1) to natural appearing (FVC 2). Unit 596-409 would meet the adopted Modification VQO and change a natural (EVC 1) area to moderately altered (FVC 4). Finally, two units (597.2-421 and 458) would be harvested in the middleground, east of Balls Lake. Unit 597.2-421 would meet the adopted Modification VQO. The associated visual condition would remain heavily altered (FVC 5). Unit 597.2-458 would also meet the adopted Modification VQO. This unit would change the visual condition from natural (EVC 1) to moderately altered (FVC 4).

Alternative 12

Alternative 12 would harvest 13 units in the Forest Highway # 9 viewshed, five of which would be located within the foreground distance zone. Unit 595-407 would be seen south and west of Control Lake. This unit would achieve the intended Partial Retention VQO, as described in Alternative 10. The heavily altered visual condition would remain unchanged (FVC 5). Units 597.2-422, 424, and 425 would also be located in the foreground, east of Balls Lake. Units 597.2-422, 597.2-424, and 425 would meet their adopted Partial Retention VQO, while converting natural areas (EVC 1) to slightly altered (FVC 3).

Nine units would be harvested in the middleground of the Forest Highway #9 viewshed. Unit 595-408 would meet the adopted Modification VQO and change the visual condition from natural (EVC 1) to moderately altered (FVC 4). Unit 595-409, which is also seen from Control Lake, would meet the adopted Partial Retention VQO and change the visual condition from natural (EVC 1) to slightly altered (FVC 3). Both 595-414 and 419 would meet the adopted Modification VQO and leave the heavily altered visual condition in their vicinity unchanged (FVC 5). Three units (596-406, 407, and 409) would be harvested in the middleground near Control Lake and Balls Lake. Units 596-406 and 407 would be partial cut, helicopter yarded, meet the adopted Partial Retention VQO, and change the visual condition from natural (EVC 1) to natural appearing (FVC 2). Unit 596-409 would meet the adopted Modification VQO and change the visual condition from natural (EVC 1) to moderately altered (FVC 4). Lastly, 597.2-421 and 458 would be harvested in the middleground, east of Balls Lake. Unit 597.2-421 would meet the adopted Modification VQO, while leaving the heavily altered visual condition unchanged (FVC 5). Unit 597.2-458 would also meet the adopted Modification VQO, but would change the visual condition from natural (EVC 1) to moderately altered (FVC 4).

Alternative 13

The effects of this alternative would be the same as described for Alternative 11 above along Forest Highway #9/30 Road.

Cumulative Visual Effects

Cumulative effects are the results of collective past, present, and reasonably foreseeable future actions. These effects include timber harvest, roads, landings, and contrasts created by slash and second growth. Cumulative effects also include harvest activities on adjacent non-National Forest System lands. These effects are dynamic and, in general, would diminish over time.

Assuming a continuation of the present harvest level (three to five entries per 100 years) and implementation of resource constraints in accordance with the 1997 TLMP through the year 2140, timber harvest would continue to occur in the Control Lake Project Area. During this time, the Forest would be in a state of obvious change towards meeting the Desired Future Condition, which emphasizes landscapes with a mixture of near natural, modified, and highly modified appearances. Following is a description of the anticipated visual condition within each of the six Priority Travel Route and Use Area viewsheds substantially impacted by the Control Lake Project.

West Coast Waterway

Assuming that the lands around Salt Lake Bay remain in the National Forest System, they would remain essentially unmodified. All suitable activities would be integrated in such a way that they remain subordinate to the characteristic landscape. If the State of Alaska selects the land around Salt Lake Bay, however, the associated docks, homes roads, and other facilities would likely contrast sharply with the characteristic landscape.

Views from Nossuk Bay and the remainder of the waterway would contain signs of logging. Management activities would remain subordinate to the natural landscape in much of the seen area. Harvest activities would dominate the characteristic landscape in small portions of the viewshed, but would respect natural form, line, color, and texture.

Waters Around Craig and Klawock

Lands adjacent to San Alberto Bay, Shinaku Inlet, and Big Salt Lake in the foreground and middleground are privately owned and have been extensively logged. As the second-growth matures, these areas would likely be harvested again, keeping them in a continually disturbed condition. National Forest System lands, which are visible in the middleground north of Big Salt Lake, would combine areas where harvest activities are dominant with areas where harvest activities are subordinate to the characteristic landscape. Logging on National Forest System lands during the next entry period could be limited by Cumulative Visual Disturbance (CVD) concerns.

Control Lake Cabin Site

If lands within the viewshed remain a part of the National Forest System, management activities would not be apparent in the foreground and would be subordinate to the characteristic landscape in the middleground and background. However, the State of Alaska intends to select this area for commercial and recreation development. Such facilities would likely contrast sharply with the characteristic landscape.

Eagle's Nest Campground (Balls Lake)

Management activities would not be apparent in foreground areas seen from the campground and lake. Lands in the middleground would contain small, irregularly shaped openings that mimic natural patterns. These openings would be unnoticed by the casual Forest visitor or subordinate to the characteristic landscape.

Forest Highway #9/30 Road

Lands nearest to Klawock are privately owned and have been extensively logged. As the second growth matures, these areas would likely be harvested again, keeping them continually disturbed. National Forest System lands visible south of the Control Lake junction vary from natural to heavily altered in appearance. Proposed harvest would be subordinate to the natural landscape or, at a minimum, borrow from natural form, line, color, and texture.

If lands surrounding Control Lake remain a part of the National Forest System, harvest would be subordinate to the natural landscape. If this area is developed by the state, strong visual contrasts with the natural landscape are likely.

East of Balls Lake, the Forest Highway #9 viewshed is largely natural in appearance. Much of the seen area would remain natural following implementation of this Project. Harvest activity visible in the foreground would be subordinate to the natural landscape. Middleground harvest would resemble natural occurrences.

Thorne River/Honker Divide Canoe Route Mitigation

Limited timber harvest would occur within this viewshed. It would not be apparent to the casual Forest visitor from the river, shore, or associated recreation facilities. Small group-selection cuts and helicopter yarding would likely be required.

Mitigation

Within the confines of the 1997 TLMP goals, objectives, standards, and guidelines, the protection of visual resources was given a high priority during the planning and design of the Control Lake Project unit pool. Use of various strategies (described below) had the effect of mitigating potential visual effects in priority travel route and use area viewsheds. In addition, measures proposed to protect recreation, wildlife, water quality, and other resources also benefitted visual quality within the Control Lake Project Area. Residual snags, leave tree islands, and stream buffers provide structure in harvest units, helping to reduce contrast with the surrounding natural landscape. The aforementioned mitigation measures are detailed in the appropriate resource sections of this document.

During Project planning, efforts were made to minimize visual impacts. Because openings are rarely found in the uniformly forested landscapes that form much of the Control Lake Project Area, it is difficult to meet the Retention VQO using clearcut management techniques. That is, any large created openings would be evident to the casual forest visitor. Therefore, alternative harvest techniques were proposed where the Retention VQO, and in certain instances the Partial Retention VQO, has been adopted. Small group-selection cuts have been prescribed for numerous units potentially visible from Control Lake, Balls Lake, and the Thorne River. These group-selection cuts were developed in strips parallel to the slope so that the intervening unharvested strips will screen the harvested strips from view. Buffers of vegetation are expected to screen these “patch cuts” from view. Assumptions made in design of “patch cuts” included minimal blowdown in residual buffer vegetation, accuracy of tree stand data (height, crown ratio, density), a finite number of viewpoints, and the accuracy of USGS topographic information. Where less restrictive VQO’s have been adopted, seedtree cuts, overstory removals, and shelterwood prescriptions were utilized, in part, to help protect the visual resource.

Where the Modification VQO has been adopted, rectilinear unit boundaries and other obvious man-made patterns in the landscape were avoided. This was performed for units seen in the foreground from the West Coast Waterway and in the middleground from Control Lake and Balls Lake.

Efforts to minimize the visual impacts created by logging roads and landings were also made during Project planning. When feasible in areas of Partial Retention and Modification VQOs, roads and landings were relocated to minimize or eliminate their visibility. More stringent measures were required within the Thorne River/Honker Divide Canoe Route viewshed to ensure that the Retention VQO would be attained. Here, the percent side slope and screening ability of residual vegetation must be considered. The size of cuts and fills will be minimized by fitting the road closely with the terrain, and by using a road surface of minimal width. If these measures fail to hide the road or landing from view (and no other feasible options exist), the surfaces are to be scarified and planted immediately after timber harvest.

Monitoring

Harvest units and roads from this project will be monitored as part of the Forest Plan monitoring report to determine if the scenery standards and guidelines have been implemented and if they are effective.

Aerial view of Nossuk Bay looking north

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Recreation, Roadless Areas, Wild and Scenic Rivers, and Wilderness Areas

Key Terms

Recreation Opportunity Spectrum (ROS)—a system for planning and managing recreation resources that categorizes recreation opportunities into six classes. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs.
Recreation place—an identified geographic area having one or more physical characteristics that are particularly attractive to people engaging in recreation activities; can contain from zero to several recreation sites.
Recreation site—specific location or site where recreational activities occur and/or a recreational facility is located. A recreation site is smaller in area than a recreation place.
Recreation Visitor Day (RVD)—a measure of recreation use of an area. One recreation visitor day consists of recreation use of a site or area by one person for 12 hours can be abbreviated "visitor day."
Roadless area—an area of undeveloped public land within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use.
Wild and Scenic River—rivers or sections of rivers designated by congressional action under the 1968 Wild and Scenic Rivers Act or by an act of the Legislature of the state or states through which they flow.
Wilderness—areas designated by congressional action under the 1964 Wilderness Act or by TTRA and/or ANILCA; undeveloped federal land retaining its primeval character and influence without permanent improvements or human habitation.

Introduction

Timber management activities can change the characteristics of areas where recreation occurs, and thus have an effect on ROS settings, recreation sites, and recreational activities. Harvest activities generally affect the visual character of ROS settings and recreation sites. As a result, there are often changes to both ROS settings and the type of recreational experiences available at recreation sites. In addition to visual changes, harvest activities frequently require new roads, making previously inaccessible, nonroaded areas accessible to motor vehicles. When an area becomes accessible to vehicles, other changes often occur, including changes to the ROS settings and to the types and quality of recreational experiences that occur in an area or at a site.

The TLMP recreation standards and guidelines acknowledge that timber management activities can affect recreation settings, but emphasizes the importance of adapting recreational opportunities as changes occur (USDA Forest Service, 1991). The recreation standards and guidelines state "where scheduled activities change the recreation setting, [an agency should] manage the new setting in accordance with the appropriate ROS guidelines. [An agency should] maintain the capability of all land use designations to provide appropriate quality recreation opportunities on a sustained basis."

Impacts on ROS Settings

All of the alternatives would change existing ROS settings in the Project Area (Table 4-32). Harvest activities associated with the various alternatives would convert varying amounts of nonroaded ROS settings (P and SPNM) to roaded settings (RM and RN). The amount of nonroaded ROS settings in the Project Area would be reduced with all alternatives (the ROS setting of P would be eliminated in all alternatives), and the amount of roaded ROS settings would be increased.

Table 4-32
Changes in Project Area ROS Settings By Alternative

ROS Setting	Existing	Alt. 10	Alt. 11	Alt. 12	Alt. 13
P	11,678	11,678	11,678	8,196	11,678
SPNM	97,838	90,832	70,330	65,199	74,420
SPM	5,678	5,560	5,680	5,680	5,560
RN	6,383	5,252	5,334	5,754	5,314
RM	49,492	57,747	78,049	86,242	74,098
Total	171,070	171,070	171,070	171,070	171,070

Harvest activities would reduce the acreage that could potentially support nonroaded recreation and increase the acreage that could potentially support roaded recreation. Alternative 12 would contain approximately 65,199 acres of SPNM and 8,196 acres of P, which is the least amount of both ROS settings among the alternatives. Alternative 10 would contain approximately 90,832 acres of SPNM and 11,678 acres of P, which is the greatest amount of both ROS setting of any of the action alternatives.

The alternatives would have somewhat different effects on the distribution of various ROS settings throughout the Project Area. Figures 4-5 through 4-8 depict where various ROS settings would occur throughout the Project Area for each alternative. As depicted in these figures, ROS settings of SPNM, SPM, and RN would be located throughout the Project Area between ROS settings of RM. All of the alternatives would leave unharvested, contiguous corridors of SPNM of varying widths and acreage along the Thorne River/Hatchery Creek waterway.

The following sections discuss the changes in existing ROS classification settings that would occur with each alternative.

Alternative 10

Alternative 10 would convert the least amount of P and SPNM of any of the alternatives. With Alternative 10, 11,678 acres of P surrounding Lake Galea would remain intact. Approximately 90,832 acres of the existing 97,838 acres of SPNM would remain. Significant areas of SPNM that would remain include all of the SPNM area in the Western Peninsula, an area on both sides of the Thorne River/Hatchery Creek waterway, an area that surrounds the area of P around Lake Galea, and an area around Rio Roberts Creek (Figure 4-5).

With Alternative 10, the amount of acreage classified as RM would increase approximately 8,255 acres to 57,747 acres, and would comprise approximately 34 percent of the Project Area.

Alternative 11

Alternative 11 would have the same effect on the P setting around Lake Galea as Alternative 10. It would convert approximately 27,508 acres of SPNM to other ROS settings. Alternative 11 would convert SPNM areas to RM along the northwestern and northeastern portions of the Project Area, in the area near Shinaku Lakes, and in the eastern portion of the Western Peninsula. Large blocks of SPNM would remain along the Thorne River/Hatchery Creek waterway, the upper portion of Rio Roberts Creek, and much of the Western Peninsula (Figure 4-6).

Figure 4-5
Alternative 10 ROS Settings

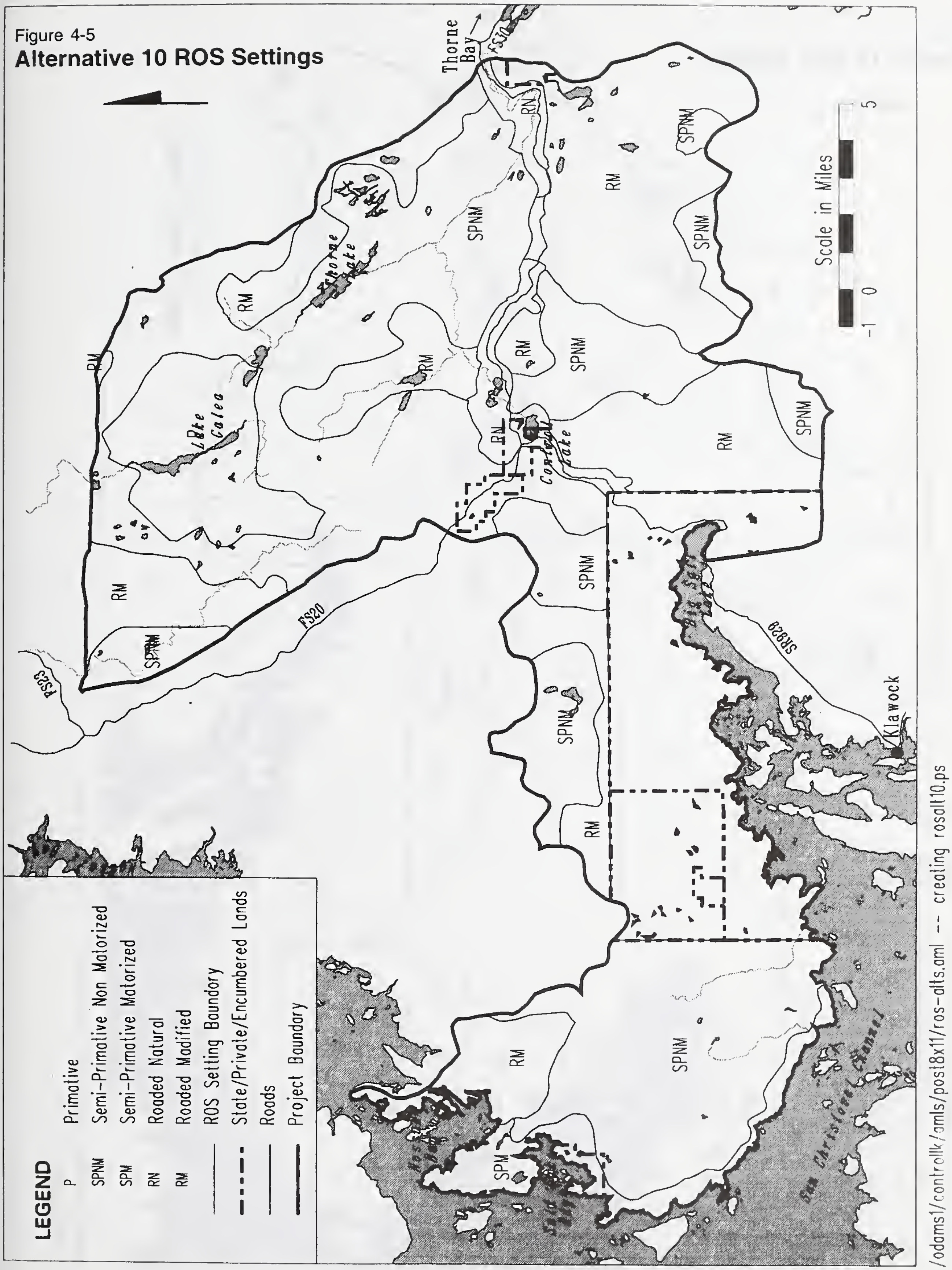


Figure 4-6
Alternative 11 ROS Settings

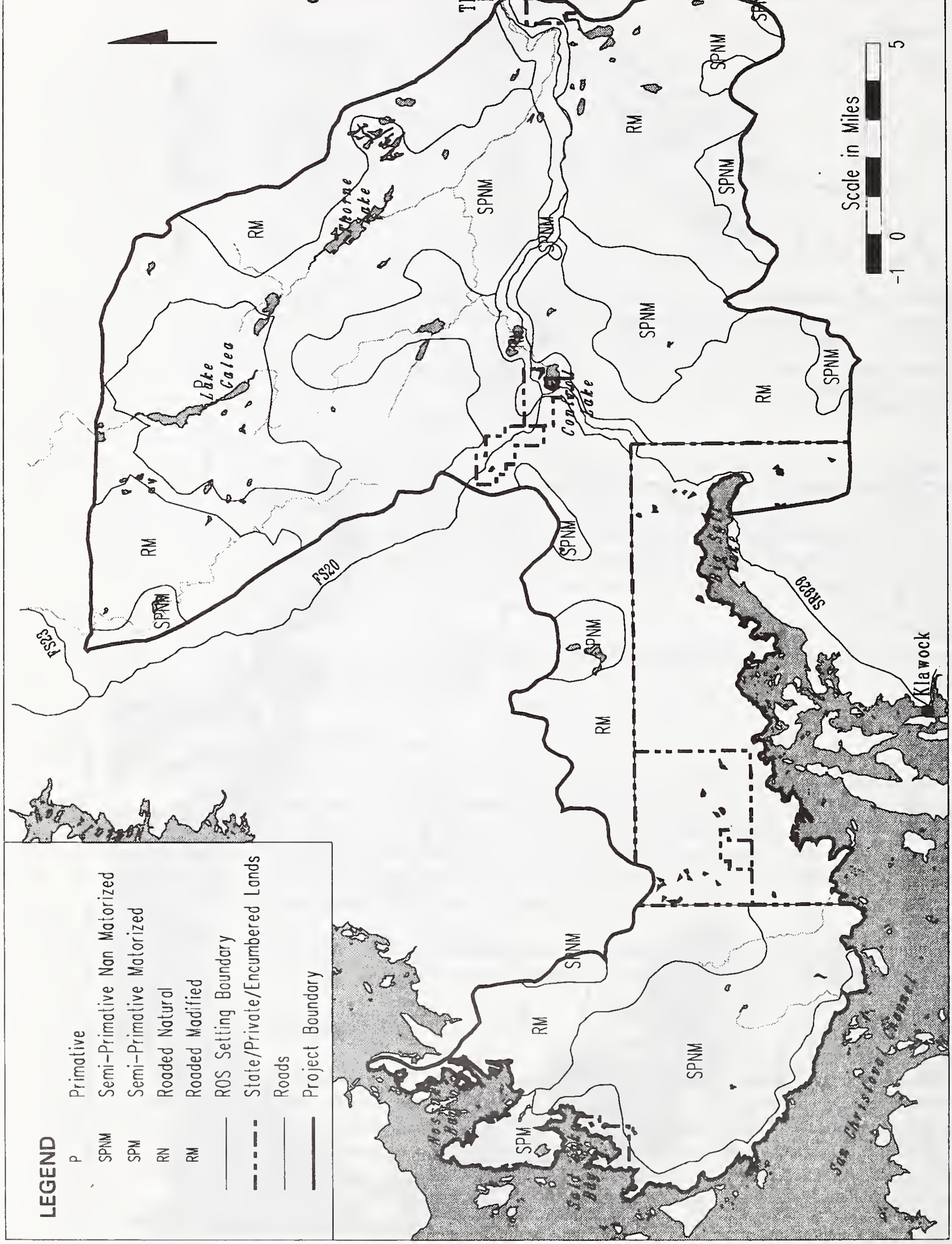
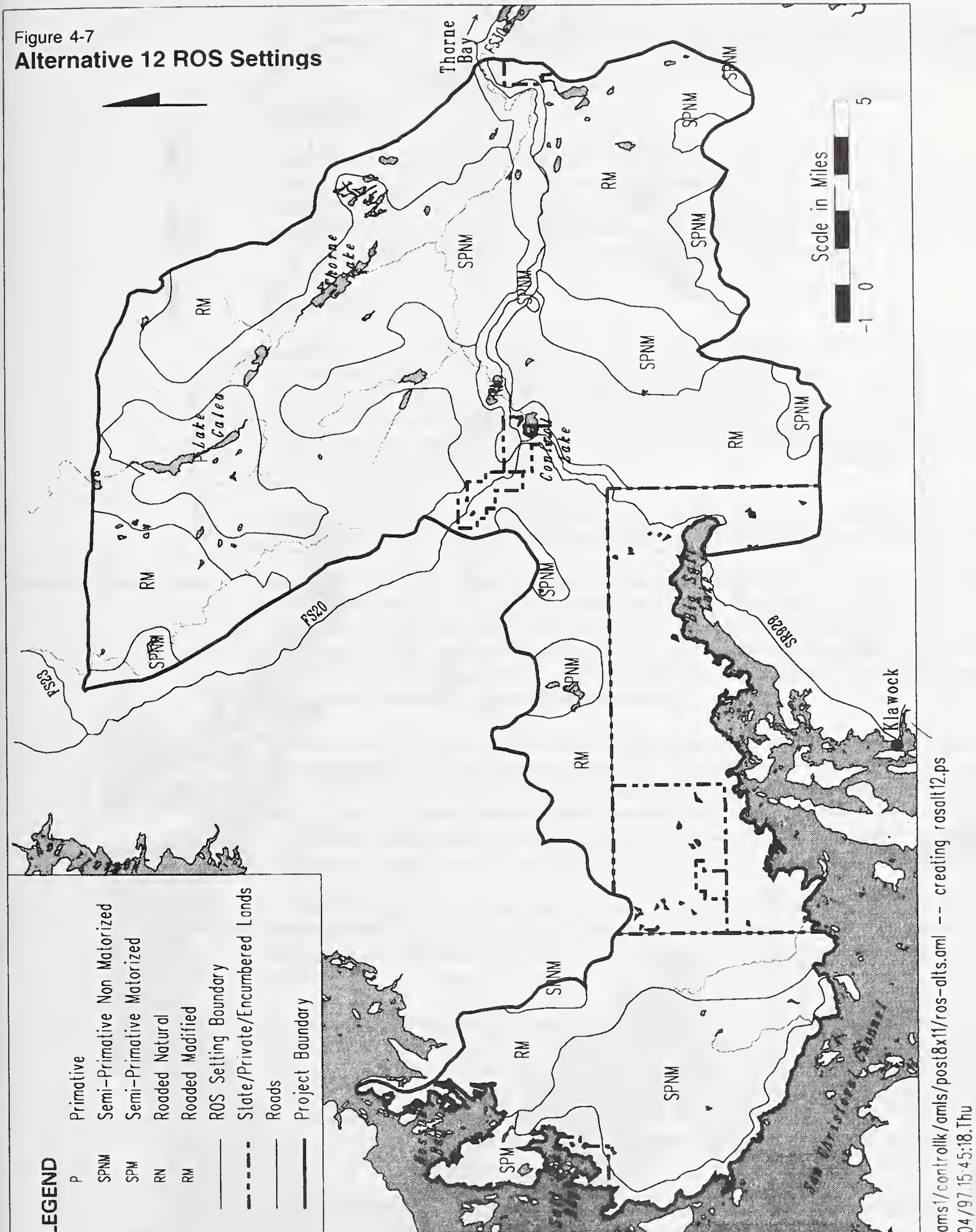


Figure 4-7
Alternative 12 ROS Settings



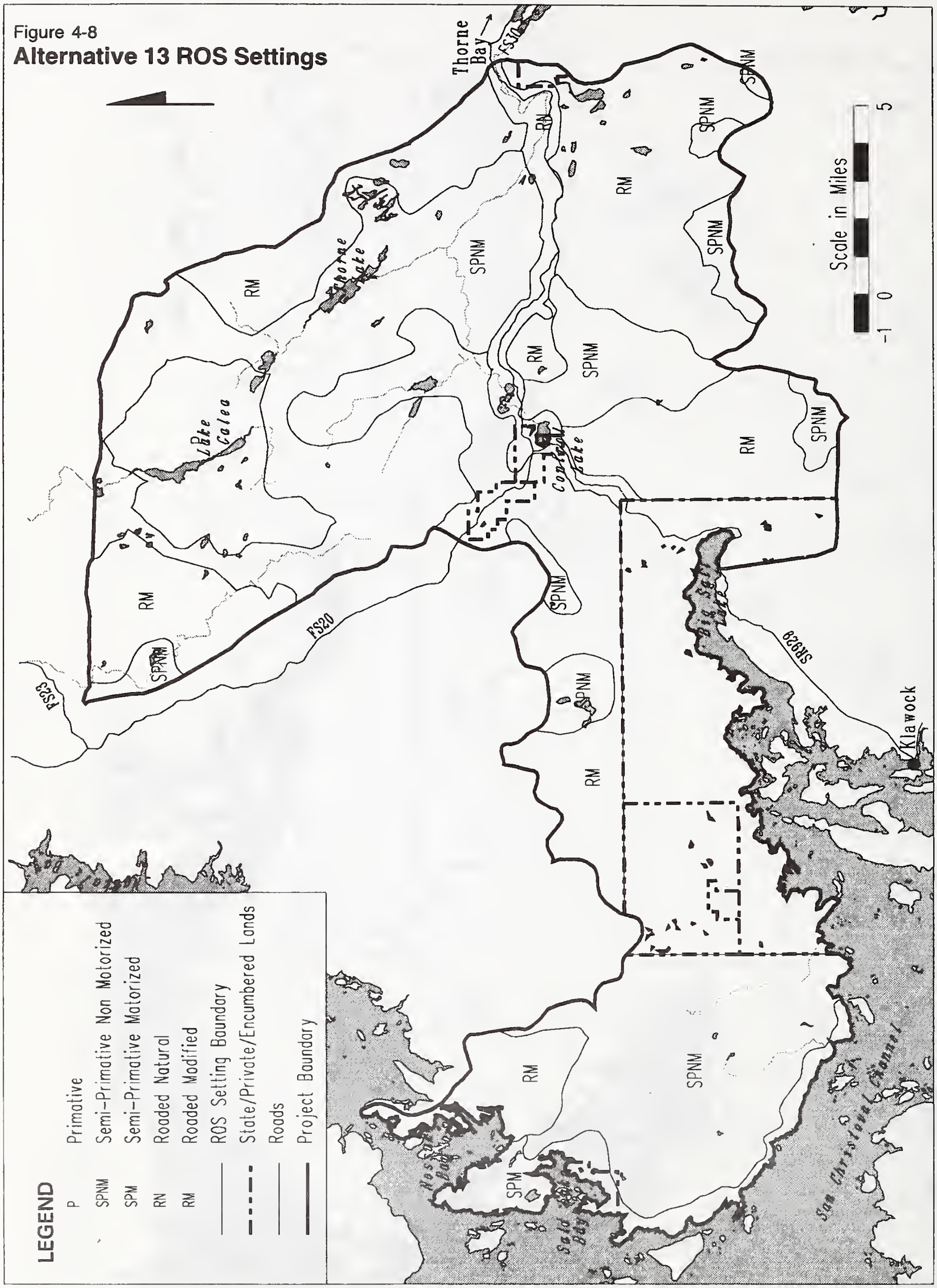


Figure 4-8
Alternative 13 ROS Settings

The amount of acreage classified as RM with Alternative 11 would increase approximately 28,557 acres to 78,049 acres, which would comprise approximately 46 percent of the Project Area.

Alternative 12

Alternative 12 would reduce the size of the P setting around Lake Galea by 3,482 acres. Alternative 12 would increase the amount of RM settings by 36,760 acres and decrease the amount of SPNM settings by 32,639 acres. Relative to Alternative 11, most changes would occur primarily near Elevenmile Creek, Steelhead Creek, Lower Logjam Creek, Upper Thorne River, Lake Galea, and along the 30 Road (Forest Road No. 9) (Figure 4-7).

Alternative 13

Alternative 13 would have the same effect on the P setting around Lake Galea as Alternative 10. It would convert approximately 23,418 acres of SPNM to other ROS settings. Alternative 13 would convert SPNM areas to RM along the northwestern and northeastern portions of the Project Area and in the area near Shinaku Lakes. Large blocks of SPNM would remain along the Thorne River/Hatchery Creek waterway, Western Peninsula, and the upper portion of the Rio Roberts Creek (Figure 4-8).

The amount of acreage classified as RM with Alternative 13 would increase approximately 24,606 acres to 74,098 acres, which would comprise approximately 43 percent of the Project Area.

Recreation Places

Recreation Places (RPs) are specific areas where recreation activities occur. Within RPs, there can be a wide range in the number of activities that occur. The quality and setting of the environment (which is characterized by ROS settings found in the RP) around RPs plays an important role in the type of activities that occur at the RP, as well as the quality of the recreation experience. The type and ease of access to RPs also influences the types of recreational activities and the quality of the recreation experience.

Timber harvest and associated activities can temporarily and permanently change the quality and setting of RPs (and ROS settings within RPs). Where roads are built, roaded access to RPs previously not accessible by road can offer opportunities for roaded recreation, and at the same time, reduce or eliminate opportunities for secluded, nonroaded recreational experiences. Timber harvest activities can also change the visual quality of RPs if those harvest activities and facilities can be seen or heard by recreationists.

To analyze the effects of the four alternatives on the RPs in the Project Area, all of the RPs were assigned to one of three categories: freshwater-, land-, and marine-based recreation. This assignment was determined by the type of physical setting required for activities that occur in the RPs.

The acreage of the various ROS settings for all of the RPs found in each of the three categories was totaled to determine the total acreage of each ROS setting for that category. For example, the acreage of the SPM setting for each of the four RPs found in the "marine-based recreation" group was added to give the total ROS setting of SPM for all marine-based recreation places. It is then possible to evaluate what the effects of each alternative would be on the SPM setting of marine-based RPs by comparing changes in acreage of SPM that would occur with each alternative.

The following sections discuss how the alternatives would change the ROS settings in the RPs found in the Project Area.

Freshwater-Based Recreation Places

Thorne River/Hatchery Creek Waterway

The four action alternatives would have varying effects on the 11 freshwater-based RPs that are associated with the Thorne River/Hatchery Creek waterway. Recreation along the waterway includes activities such as fishing, canoeing, hunting, and wildlife viewing. Although roads currently provide access to the waterway at either end of the waterway contained within the Project Area, the remote, unroaded setting of most of the waterway is considered important for some recreationists using the waterway. Some of the alternatives would require road entry into currently unroaded, remote areas. The roads would increase potential access to the waterway, which would negatively affect activities dependent on or enhanced by remote, unroaded conditions. Leaving some of the roads open would offer opportunities for roaded recreation, in areas where it does not currently exist.

Changes in ROS Settings—The 11 RPs currently contain approximately 31,913 acres of unroaded area (P, SPNM, and SPM). Alternatives 10, 11, and 13 would affect the ROS settings in the vicinity of the Thorne River/Hatchery Creek Waterway only very slightly. The acreage of land in recreation places along the Thorne River/Hatchery Creek Waterway, that would be classified as RM, would range from approximately 206 acres under Alternative 10 to 955 acres with Alternative 12 (Table 4-78). Alternative 12 would have a larger effect on RPs along the waterway. Although it would shrink in size, the area of P around Lake Galea would remain.

Changes in Recreational Experiences—Although no harvest units under any alternative would be apparent from the waterway to the casual forest visitor, the alternatives would have different effects on the quality of recreation experiences possible along the waterway. Although harvest units would not be noticeable to the casual forest visitor, road construction and harvest activities in the vicinity of the waterway would be heard and would temporarily change the remote qualities of the waterway during the harvest period. In addition, even if roads are closed after harvest, they would provide increased access to remote portions of the waterway and reduce the quality of the remote recreational experience.

Upon completion of harvest activities, most harvest-related roads under all alternatives would be closed. Although roads would be closed to automobiles, they would likely be used to some degree by recreationists on four-wheelers, trailbikes, and other all-terrain vehicles.

Outside of Thorne River/Hatchery Creek Waterway

Four of the six RPs contained in this grouping contain lakes outside of the Thorne River/ Hatchery Creek Waterway. The other two RPs are oriented around Rio Roberts Creek. Two of the lakes (Control Lake and Balls Lake) are significant local recreation resources. The acreage of ROS settings for the RPs would vary little among the alternatives. However, the effects on specific locations and recreation resources will vary noticeably among alternatives.

Changes in ROS Settings—There would be little difference among the four action alternatives in terms of the cumulative changes in the ROS settings of the RPs. The three alternatives would have similar effects in converting SPNM to RM (Table 4-33). Less than 200 acres would be involved with each alternative. There would be slightly more of a difference between the alternatives in the amount of RN converted to RM. Overall, the increase in RM would range from approximately 167 acres (Alternative 10) to 739 acres (Alternative 12).

Table 4-33

Changes in ROS Settings Found in Freshwater-Based, Land-Based, and Marine-Based Recreation Places by Alternative

	P	SPNM	SPM	RN	RM
Freshwater-Based - Thorne River/Hatchery Creek Waterway					
Existing	5,485	12,457	0	1,588	97
Alternative 10	5,485	12,389	0	1,506	206
Alternative 11	5,485	11,587	0	1,675	841
Alternative 12	4,329	12,534	0	1,769	955
Alternative 13	5,485	11,587	0	1,675	841
Freshwater-based - Out of Thorne River/Hatchery Creek Waterway					
Existing	0	3,595	0	1,641	2,750
Alternative 10	0	3,415	0	1,655	2,917
Alternative 11	0	3,449	0	1,048	3,489
Alternative 12	0	3,449	0	1,048	3,489
Alternative 13	0	3,415	0	1,089	3,489
Land-Based					
Existing	0	6,465	0	0	3,069
Alternative 10	0	6,483	0	43	3,003
Alternative 11	0	5,565	0	10	3,970
Alternative 12	0	4,709	0	0	4,826
Alternative 13	0	5,565	0	0	3,970
Marine-Based					
Existing	0	0	3,913	0	1,161
Alternative 10	0	0	3,913	0	1,161
Alternative 11	0	0	3,913	0	1,161
Alternative 12	0	0	3,913	0	1,161
Alternative 13	0	0	3,913	0	1,161

Changes in Recreational Experiences—The acreage of the various ROS settings found in the RPs would not vary significantly among the alternatives. Harvest activities and road building would be heard by recreationists using these RPs.

Land-Based Recreation Places

The Land-Based Recreation Places category consists of four RPs, three of which are located in the uplands along the northeast boundary of the Project Area. The fourth land-based RP is located in the Thorne Mountains. These RPs are difficult to access and probably receive the least visitation of the four different resource-based RPs. The most popular recreational activities engaged in at these land-based RPs is big game hunting. The alternatives would have varying effects on the existing conditions of land-based RPs.

Changes in ROS Settings—Alternative 12 would convert approximately 1,757 acres of SPNM to RM, which would be the most of any alternative. An SPNM area in the northeast corner of the Project Area would be connected with the Thorne River/Hatchery Creek Waterway SPNM area.

Changes associated with Alternative 10 would be slight. As a result, it would cause the least amount of change to the existing conditions of any of the alternatives.

Changes in Recreational Experiences—Roads and timber harvest units would change the remoteness and visual character of some of the RPs. In the long-term, harvest activities could negatively affect deer populations, which could affect recreational hunting success in the RPs. Introducing harvest units and roads into the RPs would change the visual quality and remote character currently found in some of the RPs.

Marine-Based Recreation Places

Four RPs have been classified as marine based. All four RPs are located along the shores of the Western Peninsula. Although there are no visitation numbers available, it is believed the coast of the Western Peninsula is not heavily used for recreation. Recreational activities that occur include fishing, hunting, boating, and camping. None of the alternatives would have any effect on these RPs.

Recreation Sites

As discussed in Chapter 3, recreation sites are specific locations where existing or potential recreational activities can occur. Some recreation sites have facilities, such as cabins, that recreationists use. Others are simply good locations for specific activities, such as anchorages that are sited in areas that offer safe moorage and frequently have freshwater sources nearby.

Timber harvest activities can affect the recreational experiences available at recreation sites. As new roads are built for timber harvest, remote recreation sites generally become accessible to more people. As the Prince of Wales Island road system expands because of timber harvest activities, there will be additional areas for people to visit via motor vehicle. As more people visit the island, there will be greater use of recreation sites in roaded ROS settings due to increased accessibility by motor vehicle. There will be a corresponding decrease in recreation sites located in roadless ROS settings.

Tables 4-34 and 4-35 illustrate that the five alternatives would not change the ROS settings where existing and potential recreation sites are located.

Table 4-34
ROS Settings of Existing Recreation Sites by Alternative

ROS Setting	Existing	Alt. 10	Alt. 11	Alt. 12	Alt. 13
P	1	1	1	1	1
SPNM	1	1	1	1	1
SPM	9	9	9	9	9
RN	5	5	5	5	5
RM	0	0	0	0	0
Total	16	16	16	16	16

Table 4-35
ROS Settings of Potential Recreation Sites by Alternative

ROS Setting	Existing	Alt. 10	Alt. 11	Alt. 12	Alt. 13
P	0	0	0	0	0
SPNM	5	4	4	4	4
SPM	3	3	3	3	3
RN	4	3	3	3	3
RM	0	2	2	2	2
Total	12	12	12	12	12

The opportunities for recreating at existing and potential recreation sites located in remote undisturbed areas would decrease with all the alternatives, while opportunities for recreation in roaded areas would increase. However, closing roads at the completion of harvest would restrict roaded access to those recreation sites that would be located in roaded areas. The closed roads could, however, be used by recreationists walking or riding all-terrain vehicles in order to gain access to remote recreation sites.

Commercial Outfitters and Guides

As discussed in Chapter 3, it is difficult to establish the amount of use the Project Area receives from outfitters and guides. Twenty-seven special-use permits from the Forest Service were requested by outfitters and guides for streams and lakes in the Project Area in 1993, including nine for the Thorne River. There has been some interest expressed by outfitters in taking clients on canoe/kayak trips along the Thorne River/Honker Divide Waterway. Two outfitters expressed interest in providing tours through the Thorne River/Hatchery Creek Waterway (personal communication, November 4, 1993, K. Lakemore, Owner, Alaska Discovery Tours, Juneau, Alaska; letter, June 20, 1994, B. Burdett, owner, Southeast Exposure, Ketchikan, Alaska).

It is not known how much local guides and outfitters use the Western Peninsula of the Project Area and the coastal areas near the Project Area; however, it is known that these areas receive use from operators working out of Klawock and Craig.

In 1985, 72 "access-oriented" outfitters operating in Southeast Alaska were surveyed to determine what environmental qualities were important for their businesses. The outfitters and guides reported that the five most important characteristics were, in descending order of importance, scenery, wilderness, wildlife, fishing, and solitude (Bright, 1985). The single most frequently mentioned activity (34 percent of respondents) that would cause outfitters and guides to avoid an area was timber harvest. The second most frequently mentioned activity was "heavy use" of an area by other people.

All of the alternatives would change the "scenery" and "wilderness" characteristics of various parts of the Project Area to varying degrees. Although no harvest activities would be noticeable from the waterway by the casual forest visitor, noise could be heard along the waterway during harvesting. In addition, roads would allow increased access near the waterway, both during and after the harvest period. As a result, outfitters and their clients would experience more frequent encounters with other recreationists.

For all alternatives, timber harvest activities would at least temporarily disturb some of the wilderness qualities currently found along the Thorne River/Hatchery Creek Waterway. The closest timber harvest and road construction to this area is more than 1 mile from the river and lakes. The two outfitters mentioned above (Alaska Discovery Tours and Southeast Exposure) expressed concern that harvest activities in the Honker Divide could change the type of experience possible, and compromise the potential of the area for outfitters (personal communication, November 4, 1993, K. Lakemore, Owner, Alaska Discovery Tours, Juneau, Alaska; letter, June 20, 1994, B. Burdett, owner, Southeast Exposure, Ketchikan, Alaska).

Although the degree of impact the alternatives would have on potential outfitter and guide use of the project area is difficult to determine, general assumptions can be made. The effects of Alternatives 10, 11, and 13 would be negligible because of the low amount of harvest in the vicinity and the fact that the road system would not be extended anywhere close to Honker Divide. It can be assumed that Alternative 12 would have a slightly greater impact on outfitter and guide use of the Thorne River/Honker Divide than Alternatives 10, 11, and 13 because Alternative 12 would have more harvest activity in the vicinity of the waterway, and would extend the road system closer to Lake Galea.

Effects of Timber Industry Facilities and Employees

The establishment of logging facilities, such as roads and camps in remote areas, can impact recreation near those facilities for the duration of harvest activities. It can be assumed that logging personnel partake in at least some of the recreational opportunities available in a project area. Activities such as fishing and hunting would be expected to be particularly popular. Impacts to local fish and game populations from employee hunting and fishing activities would be difficult to predict. Impacts to subsistence users and other recreationists as a result of employee hunting and fishing in an area would also be difficult to estimate. However, Schwan concluded in the *Southeast Alaska Sport Fish Assessment* that employees at logging camps often, "place heavy pressures on local stocks." Schwan further stated that popular species such as steelhead and cutthroat trout are frequently targeted and traditional users "may be forced" to find new fishing areas (Schwan, 1984).

Employee-generated impacts from the Control Lake timber sales would not be as great as with other sales. Because most of the logging personnel that would be involved in the Control Lake timber sale would be expected to already live in existing communities, there would be no need for logging camps. As a result, many of the impacts associated with employees living in remote logging camps would not occur during the Control Lake timber sales.

The primary impacts from logging personnel that could be expected from any of the alternatives associated with the Control Lake sales, would be from the roaded access that logging personnel would have to previously inaccessible areas. Current recreational users of those areas, may avoid such areas due to the presence of new users, increased competition for resources, or changes in the characteristic settings of those areas (changes in perceived solitude and remoteness).

Road Management

The introduction of roads into previously unroaded areas has both positive and negative consequences for recreation. The negative consequences can be attributed to changes in the characteristics and attributes of unroaded areas, and the resulting impacts to recreation activities that require those attributes. On the other hand, roads can make an area accessible for recreational activities that do not require unroaded characteristics and attributes.

Some of the roads that would be built under the various alternatives would remain open for ongoing silvicultural activities and would allow for incidental recreational access. Other new roads would be closed to public access to protect resources such as big game and for economic reasons (low funds for road maintenance). See *Access Management* in the *Transportation and Facilities* section.

Roadless Areas

All of the alternatives would reduce the amount of land in the Project Area classified as unroaded (Table 4-36). Unroaded areas are here defined as the ROS settings P, SPNM, and SPM (see Chapter 3).

Table 4-36
Roadless Areas (Within Project Area) Under Each Alternative

Roadless Area	Existing	Alt. 10[1/]	Alt. 11[1/]	Alt. 12[1/]	Alt. 13
Kogish (509)	52,575	51,140	39,296	36,851	43,818
Karta (510)	20,968	14,979	15,226	13,421	14,847
Thorne River (511)	55,946	55,946	52,381	48,427	52,381
Total	129,489	122,065	106,656	98,699	111,046
% Change in Roadless Area	-	(-6%)	(-18%)	(-24%)	(-14%)

1/ Estimate based on the change in unroaded ROS classes (P, SPNM, SPM).

Alternative 12 would result in the least amount of unroaded area of the alternatives. Approximately 98,699 acres would be left in a roadless condition. Alternative 10 would leave the most roadless area of the three action alternatives, approximately 122,065 acres.

The following discusses the effects of the alternatives on the three roadless areas found in the Project Area.

Kogish (Roadless Area 509)

The Kogish Roadless Area is located in the Western Peninsula portion of the Project Area. Alternative 10 would result in minor harvest activity in the roadless area resulting in a reduction in its size of 3 percent. Alternatives 11 and 12 would reduce the size of the roadless area by 25 to 30 percent. Alternative 13 would reduce the size of the roadless area by 17 percent.

Karta (Roadless Area 510)

Alternative 12 would reduce the size of the Karta roadless area located in the Project Area by 36 percent. The other three action alternatives would result in a reduction of 27 to 29 percent in the size of the Karta Roadless Area.

Thorne River (Roadless Area 511)

Alternative 12 would have the greatest effect on the existing Thorne River Roadless Area found in the Project Area resulting in a 13 percent size reduction. Alternatives 11 and 13 would result in a 6 percent change and Alternative 10 would produce no change in the size of this roadless area.

Effects on Wild and Scenic Rivers

As mentioned in Chapter 3, the Thorne River/ Hatchery Creek system will be recommended for Scenic and Recreation Classification for inclusion into the National Wild and Scenic River System per the Forest Plan ROD.

The lower 6 miles of the river system meet the criteria for Recreation River classification. The remaining 36 miles of the system meet the criteria for Scenic River classification. The river system has a 0.5-mile protective corridor on either side of the river system. The corridor is composed of an inner 0.25-mile-wide zone on each side of the river which is defined by the TLMP Revision (1997) as a Scenic/Recreation River LUD.

No harvest units or roads in any of the alternatives fall within the 0.25-mile inner zone, although all the alternatives would place some units within the outer zone. Harvest Units 597.1-406 and 597.2-425 would be located on the boundary of the inner zone with Alternative 12. The river segment in which the units are located is along the Recreation River segment. The segment would continue to meet that criteria even with harvest of the units. None of these units occurs in Alternative 10, 11, or 13.

Wilderness

The Karta Wilderness would be minimally affected by project related harvest activities. All of the alternatives would have some harvest units located within 0.5 mile of the border of the Karta; although none would be within 0.25 mile. Harvesting units located adjacent to or near the Karta would change the ROS settings of some lands in and near the Wilderness. All of the alternatives would convert approximately 4,000 acres of the Project Area near the Wilderness presently classified SPNM to RM. An additional 500 acres within the Wilderness currently classified as SPNM would be converted to RM.

Cumulative Effects

Although increases in the amount of recreation use that will occur in the future in the Project Area are difficult to determine, visitation in the Tongass National Forest and Prince of Wales Island has grown rapidly in the past few years (USDA Forest Service, 1991). This growth includes the number of arrivals, modes of transportation, and types of activities. Past and current studies indicate the main attractions for recreationists include scenery, wildlife, feelings of remoteness, and a sense of vastness. These trends are likely to continue. The marine and undeveloped character of the Tongass National Forest and Prince of Wales Island play an important role in attracting recreationists and in meeting their expectations.

As the Project Area changes over time, so may the makeup of visitors and the activities they pursue. As the complexion of the forest setting and associated recreation resource change, recreationists will have three general options. Many will adapt to the new situations. Setting changes and changes in the character of other recreationists will have little or no impact to some of the current forest users. For others, the changing scenario may not be acceptable, and these users will be displaced to other areas where the setting and use patterns are more in line with their expectations and needs. Still others may find they can adapt to the new situation, or find new areas to use, and thus may substitute other activities for their leisure time.

The most popular and fastest growing recreational activity demands are those associated with Semi-Primitive Motorized ROS class setting (USDA Forest Service, 1991). Activities associated with P and SPNM settings are the second most popular and second fastest growing activities in the Tongass National Forest. The activities least in demand but also growing, are those associated with Roaded settings.

Setting changes are generally recognized as a one-way street, moving toward the developed end of the ROS spectrum. Given enough time, roaded settings in the Southeast Alaska rainforest can revert to semiprimitive conditions. The analysis indicates that, as the Project Area is developed over the next decade, an over-supply of roaded settings in the central part of Prince of Wales Island may exist. At the same time the Tongass National Forest is large enough that an adequate supply of P and SPNM settings will remain.

Tourism is also tied directly to the natural scenery, vastness, and remoteness of the area. Some of the tourism opportunities from cruise ships and the like will remain unaffected as long as scenery along critical travel routes remains natural appearing. The adventure traveler requires quality-based opportunities, and will compete for capacity of certain settings as the forest changes over time. Certain groups of recreationists, such as off-road vehicle users, will find activities enhanced as the forest is developed over time, while others will find opportunities lessened.

As use and demand increase, more competition for resources will occur. For some of these resources, such as fishing, substitute opportunities may be present in a different area, or the change in settings may make little difference as long as the sought-after resource is in ample supply. For other resources, such as solitude, there may be no substitute.

Social encounters will also increase over time. This may not have a great impact in modified settings. The impact will be felt most in the undeveloped settings, especially in those alternatives that reduce these settings the most. As P and SPNM settings are reduced, conflicts between users will likely increase as well, the degree being relative to the amount of change in the alternatives. This conflict may be between user groups engaged in different activities, such as Motorized versus Non-Motorized, or between residents and tourists vying for the same unique opportunities with few substitutes.

ROS Settings

Prior to the Long-term Contract, the vast majority of Prince of Wales Island would have been designated with ROS settings of P or SPNM. Timber harvest activities have changed the landscape of parts of Prince of Wales Island, and have introduced roads into unroaded areas. As a result, the amount of land previously classified as SPNM and P has decreased and opportunities for recreation in those areas has been diminished. Current, planned, and reasonably foreseeable harvest activities on Prince of Wales Island have, and will continue to, reduce opportunities for recreation in remote, primitive areas.

While the amount of P and SPNM has decreased, the amount of RM land on Prince of Wales Island has increased. As a result, there has been an increase in the amount of land that recreationists can access by road. Timber harvest will continue to result in new roads, and the amount of land where roaded recreation could occur will also increase.

Timber harvesting and road building will continue on Prince of Wales Island, but to a much lower extent under the new Forest Plan (1997). The Control Lake alternatives would contribute to the reduction of P and SPNM areas and the subsequent increase in RM areas. As long as the TLMP recreation standards and guidelines are followed, the current and future changes to ROS settings that will occur as a result of timber harvest activities will be consistent with the TLMP.

Recreation Places

As with ROS settings, timber harvest activities are changing the recreational experiences available at RPs. As new roads are built for timber harvest, some remote RPs will become accessible to greater numbers of people. As the Prince of Wales Island road system expands as a result of timber harvest activities, there will be additional areas for people to visit via motor vehicle. As more people visit the island, there will be greater use of recreation resources, particularly those accessible by roads or located near roads. All of the alternatives would result in the construction of new roads, some of which would be left open upon completion of harvest activities to provide roaded access to RPs. Other roads would be closed upon completion of harvest activities, in part to restrict roaded access to some remote RPs.

Good fishing offers one of the more popular forms of recreation in the Project Area.

Recreation Sites

Timber harvest activities can change the recreational experiences available at specific existing and potential recreation sites. As new roads are built for timber harvest, remote recreation sites will become accessible to greater numbers of people. As the Prince of Wales Island road system expands as a result of timber harvest activities, there will be additional areas for people to visit via motor vehicle. As more people visit the island, there will be greater use of recreation sites, particularly those accessible by road. All of the alternatives would result in the construction of new roads, some of which would make existing and potential recreation sites accessible by road.

For those recreationists that desire less accessible, more natural appearing recreation sites, roads and timber harvest activities will likely have a negative effect on their satisfaction levels at specific recreation sites. The opportunities for recreating at remote, undisturbed recreation sites will decrease throughout Prince of Wales Island as roads reach many remote sites and harvest activities change the character of the landscape near those sites. As a result, recreationists desiring remote, unroaded recreation sites will have fewer choices on Prince of Wales Island available to them.

Mitigation

Harvest activities change recreational opportunities in an area. Mitigation efforts can reduce impacts to certain types of recreation opportunities, and enhance opportunities for others. The mitigation measures outlined for the Control Lake Project Area attempt to accomplish two objectives.

One objective is to preserve most of the unroaded recreational opportunities that exist along the Thorne River-Hatchery Creek. To that end, all roads would be closed at completion of harvest activities (see Access Management in the Transportation and Facilities section). Some roads in the southern most part of the Honker Divide would remain open to selected points to allow access to the waterway. Closing all other roads would prevent authorized roaded access in many areas of the Project Area in order to preserve undeveloped, semi-primitive recreational opportunities.

The other major recreational objective for mitigation efforts is to provide more recreational opportunities for local recreationists and more roaded recreational opportunities. New facilities such as roads, parking areas, short access trails from roads to lakes, streams, and interpretive facilities are proposed. The following measures provide additional recreational opportunities in the Project Area. All of these measures require future funding in order to be implemented.

Thorne River-Hatchery Creek Waterway/Honker Divide

The middle and upper areas of the waterway will remain as pristine and primitive as possible for the enjoyment of recreationists seeking a primitive experience along a unique (in Southeast Alaska) waterway. The lower section will continue to accommodate more recreationists as a result of existing access to the waterway from existing roads.

All new roads in the Honker Divide area will be closed upon completion of harvest activities to keep the area as remote as possible, and to minimize the effects of roads on roadless area recreational opportunities.

Monitoring

ROS standards and guidelines will be monitored as part of the Forest Plan monitoring report to determine if they were implemented and effective. In addition, the suitability of proposed wild and scenic rivers will be monitored.

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Other Environmental Considerations

Irreversible Commitments of Resources

Irreversible commitments are decisions affecting nonrenewable resources such as soils, wetlands, unroaded areas, and cultural resources. Such commitments are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or because the resource has been destroyed or removed.

The construction of roads, to provide access to the Forest, is an irreversible action because of the time it takes for a constructed road to revert to natural conditions. Irreversible actions also include the associated rock quarries which are developed in conjunction with these roads. Alternative 1 would have no new road construction while Alternatives 10, 11, 12, and 13 would construct between 19 and 77 miles of new roads. This would require up to 700 acres of ground to be irreversibly committed to roads, landings, and rock quarries under the worst-case assumption that the roads will commit a 75-foot-wide corridor.

There is approximately 130,000 acres of roadless area as identified in the TLMP Revision (USDA Forest Service, 1997) that might be affected by the Control Lake Project. A decision to develop these roadless areas would mean that their primitive character in terms of opportunities for solitude, remoteness, and development of wilderness skills would irreversibly be gone. Table 4-36 shows the number of roadless acres and the change in roadless area by alternative. Under the range of action alternatives, approximately 7,000 to 31,000 acres of currently roadless area would be irreversibly committed.

Old-growth habitat lost due to logging could be considered an irreversible effect since it is not expected to regain old-growth characteristics for at least 200 years. From 834 to 3,328 acres of productive old growth would be harvested in Alternatives 10 through 13.

Loss of soil due to erosion and mass failures is an irreversible commitment. However, due to the incorporation of Best Management Practices (BMPs), Forest Plan standards and guidelines, and mitigation measures specified in this document, it is not anticipated that there would be any significant soil loss under any alternative.

Loss of cultural resource sites resulting from accidental damage or vandalism would be an irreversible commitment of resources. The standards and guidelines, survey methodology prior to activities, and mitigation measures specified in this document provide reasonable assurance that there would be no irreversible loss of cultural resources.

Irretrievable Commitments

Irretrievable commitment of natural resources means loss of production or use of resources because of management decisions made in the alternative. This represents opportunities foregone for the period of time that the resource cannot be used.

The reduction in the visual quality of an area because of timber harvesting will be an irretrievable commitment of resources. The commitment is considered irretrievable since viewsheds will typically heal from a visual quality standpoint after about 40 years. After this time, the second-growth trees will have the color and height needed so as not to be evident to the casual observer. Alternative 1 will have no irretrievable commitment of visual quality. Alternatives 10, 11, 12, and 13 will irretrievably commit visual resources because of timber harvesting.

4 Environmental Consequences

Short-term Uses and Long-term Productivity

The use of natural resources for long-term sustained yield is at the basis of National Forest management and direction. The proposed timber harvesting under the BMPs, Forest Plan standards and guidelines, Forest Plan LUDs, and Regional Guide direction will result in no long-term loss in productivity.

Possible Conflict with Plans and Policies of Other Jurisdictions

The regulations for implementing NEPA require a determination of possible conflicts between the proposed action and the objectives of Federal, State, and local land-use plans, policies, and controls for the area. The major land-use regulations of concern are the Coastal Zone Management Act (CZMA), Section 810 of ANILCA, and the State of Alaska's Forest Practices Act. A discussion of each of these determinations is presented below.

Coastal Zone Management Act of 1976 (CZMA)

The CZMA was passed by Congress in 1976 and amended in 1990. This law requires Federal agencies conducting activities or undertaking development affecting the coastal zone to ensure that the activities or developments are consistent with approved state coastal management programs to the maximum extent practicable. The State of Alaska passed the Alaska Coastal Management Act in 1977 to establish a program that meets the requirements of the CZMA. It contains the standards and criteria for a determination of consistency for activities within the coastal zone.

Forest Service requirements for consistency are detailed in a Memorandum of Understanding between the State of Alaska and the Regional Forester, dated October 8, 1981. Standards against which the consistency evaluation will take place are: Forest Practices Act, Water, Air, Energy, and Environmental Conservation; and the Alaska Forest Practices Act of 1990.

The Forest Service has designed all alternatives to ensure that the activities and developments affecting the coastal zone are consistent with approved coastal management programs to the maximum extent practicable.

Alaska National Interest Lands Conservation Act of 1980 (ANILCA)

Under Section 810 of ANILCA, agencies are required to evaluate the effects of proposed actions on subsistence uses of Federal land and to determine if the proposed action may significantly restrict subsistence opportunities. Refer to the Subsistence section of this chapter for the evaluation of impacts to subsistence use as a result of the alternatives.

State of Alaska's Forest Practices Act of 1990

On May 11, 1990, the governor approved the legislature's major revision of the State's Forest Practices Act (FPA). The revised act significantly increases the State's role in protecting and managing important forest resources on State and private lands. The revised FPA will also affect National Forest management through its relationship to the Alaska Coastal Management Program and the Federal CZMA discussed above.

For National Forest timber operations such as proposed for the Control Lake Project the effect of the revised FPA is essentially two-fold. First, it clarifies that the revised FPA regulations are the standard which must be used for evaluating timber harvest activities on Federal lands for purposes of determining consistency to the maximum extent practicable with the Alaska Coastal Zone Management Program. Secondly, it calls for minimum 100-foot buffers on all Class I streams, and recognizes that consistency to the maximum extent possible for purposes of the Alaska Coastal Management Program is attainable in Federal timber harvest activities using specific methodologies which may differ from those required by the revised FPA or its implementing regulations.

The TTRA prohibited commercial timber harvesting within buffer zones established on all Class I streams and those Class II streams which flow directly into a Class I stream. Buffer zones have a minimum width of 100-feet slope distance from the edge of either side of the stream. In addition, the Forest Service is currently working with the Alaska State Division of Governmental Coordination on a revision of an agreement between the State and the Forest Service. This revised agreement will establish the policies and procedures for coordinating state review of Forest Service programs and activities, including those covered by the FPA and the Alaska Coastal Management Program.

The Forest Service will evaluate the alternatives prior to completion of the Final EIS and the ROD to ensure that the activities and developments specifically covered by the FPA are consistent with its provisions to the maximum extent possible.

Energy Requirements and Conservation Potential of Alternatives

The implementation of the proposed actions in the Project Area will require the expenditure of energy (consumption of fuel). The amount of energy used varies by alternative based on timber volume harvested and miles of road constructed or reconstructed. The direct effect of the alternatives on energy requirements would be attributed to timber harvest, road construction and reconstruction, and travel necessary to administer the timber sale. Indirect energy requirements include processing wood products and the transport of the products to secondary processors and consumers.

Fuel Consumption

Fuel consumption requirements were estimated as follows:

Timber Sale Preparation and Administration	1.56 gallons/MBF
Cable Logging	2 gallons/MBF
Helicopter Logging	8 gallons/MBF
Load, Haul, Dump, and Tow	8 gallons/MBF
Road Construction	4,000 gallons/mile
Road Maintenance	20 gallons/mile

The estimated total fuel consumption required for each alternative is displayed in Table 4-37.

Table 4-37
Estimated Fuel Consumption

	Alt. 1	Alt. 2	Alt. 7	Alt. 8	Alt. 9
Thousands of gallons	0	325	922	1,143	760
Average gallons/MBF	0	12.7	13.0	13.4	12.5

Source: Forest Service, Ketchikan Area, GIS database.

Conservation Potential

To conserve fuel and/or minimize costs, the Forest Service has undertaken studies nationwide and on the Stikine area of the Tongass National Forest and allowed experimentation with new or different equipment or techniques. Shovel yarding is estimated to use 2.7 gallons of fuel per MBF, which is almost a gallon more per MBF than for cable yarding. However, savings are realized in employee costs. Crew size and labor cost per MBF is reduced with a crew of 1-2 versus an average of 4 for cable yarding.

The use of low tire pressure equipment (central tire inflation-CTI) during road construction and logging has also shown to decrease costs during studies nationwide and on the Stikine Area of the Tongass National Forest. Studies on Mitkof Island indicate that 10 to 14 percent less rock was needed during road construction, resulting in cost savings of approximately $450,000. It is predicted that costs for rock replacement/road maintenance, log truck fuel, and tire repair and replacement, will be decreased. Cost savings have proven to be substantial enough that the Forest Service provides a contract clause allowing a reduction in rock replacement deposits when low tire pressure equipment is used.

The use of cable yarding equipment fitted with mechanical or hydraulic interlocks, provides the ability to decrease yarding expense as the throttle and brake do not have to be rode simultaneously to provide deflection for the turn of logs.

Natural or Depletable Resource Requirements and Conservation Potential of Alternatives

All alternatives considered in detail are designed to conform to applicable laws and regulations pertaining to natural or depletable resources, including minerals and energy resources. Regulation of mineral and energy activities on the National Forest, under the U.S. Mining Laws Act of 1872 and the Mineral Leasing Act of 1920, is shared with the Bureau of Land Management (BLM). The demand for access to National Forest system lands for the purpose of mineral and energy exploration and development is expected to increase over time.

The action alternatives propose road construction that will increase opportunities for access to the National Forest within the Project Area. This increased access may result in increased activity with regard to both known and potential mineral or energy resource occurrences. There are two mining claims within the Project Area. The actual potential for increased mineral or energy resource activity in the Project Area is not known, nor can an accurate estimate be made.

Urban Quality, Historic and Cultural Resources, and the Design of the Built Environment

The Project Area contains no urban areas. Therefore, the only applicable concern under this topic is with historic and cultural resources. The goal of the Forest Service's Cultural Resource Management Program is to preserve significant cultural resources in their field setting and ensure they remain available in the future for research, social/cultural purposes, recreation, and education. The direct, indirect, and cumulative effects of the alternatives on cultural resources have been evaluated. The result of this evaluation is the determination that there are adequate standards, guidelines, and procedures to protect cultural resources and to meet the goals of the Cultural Resource Management Program. Cultural resources are discussed further in the Cultural section of this chapter.

Effects of Alternatives on Consumers, Civil Rights, Minorities, and Women

All Forest Service actions have the potential to produce some form of impact, positive and/or negative, on the civil rights of individuals or groups, including minorities and women. The need to conduct an analysis of this potential impact is required by Forest Service Manual and Forest Service Handbook direction. The purpose of the impact analysis is to determine the scope, intensity, duration, and direction of impacts resulting from a proposed action. For environmental or natural resource actions, such as proposed for the Project Area, the civil rights impact analysis is an integral part of the procedures and variables associated with the social impact analysis. This analysis is discussed in the *Economic and Social Environment* section of this chapter.

The effect of the alternatives on consumers is reflected in the discussion of the various goods and services supplied as a result of the proposed actions. This analysis occurs throughout the chapter as an integral part of the analysis of the effects on other components of the environment.

Effects of Alternatives on Prime Farmland, Rangeland, and Forest Land

All alternatives are in keeping with the intent of Secretary of Agriculture Memorandum 1827 for prime land. The Project Area does not contain any prime farmlands or rangelands. Prime forest land does not apply to lands within the National Forest system. In all alternatives, lands administered by the Forest Service would be managed with a sensitivity to the effects on adjacent lands.

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Chapter 5

References

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References

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Chapter 6

Glossary

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Acronyms

ACMP	Alaska Coastal Management Program
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
AHMU	Aquatic Habitat Management Unit
AMS	Analysis of the Management Situation, Tongass National Forest Land and Resource Management Plan Revision
ANCSA	Alaska Native Claims Settlement Act of 1971
ANILCA	Alaska National Interest Lands Conservation Act of 1980
ASQ	Allowable Sale Quantity
ATTF	Alaska Timber Task Force
ATV	All-terrain Vehicle
BBF	Billion board feet
BLM	Bureau of Land Management
BMP	Best Management Practice
CFL	Commercial Forest Land
CFR	Code of Federal Regulations
COE	Army Corps of Engineers
CZMA	Coastal Zone Management Act of 1976
DBH	Diameter at Breast Height
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EVC	Existing/Expected Visual Condition
FEIS	Final Environmental Impact Statement
FPA	Forest Practices Act
FSH	Forest Service Handbook
FTE	Fulltime Equivalent
GIS	Geographic Information System
GMU	Game Management Unit
IDT	Interdisciplinary Team
IPASS	Interactive Policy Analysis Simulation System
KPC	Ketchikan Pulp Corporation
KV	Knutsen-Vandenberg Act
LTF	Log Transfer Facility
LUD	Land Use Designation
LWD	Large Woody Debris
M	Modification
MA	Management Area
MBF	Thousand board feet
MIS	Management Indicator Species
MM	Maximum Modification
MMBF	Million board feet
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act of 1969 (as amended)
NFMA	National Forest Management Act
NMFS	National Marine Fisheries Service

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NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
ORV	Off-road Vehicle
P	Preservation
PR	Partial Retention
PRIM	Primitive
R	Retention
RM	Roaded Modified
RMO	Road Management Objective
RN	Roaded Natural
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
ROT	Remain-open Temporary
RVD	Recreation Visitor Day
SHPO	State Historic Preservation Officer
SPM	Semi-Primitive Motorized
SPNM	Semi-Primitive Non-Motorized
TDS	Total Dissolved Solids
TIS	Transportation Inventory System
TLMP	Tongass Land Management Plan
TRUCS	Tongass Resource Use Cooperative Survey
TTRA	Tongass Timber Reform Act
USDA	United States Department of Agriculture
USD1	United States Department of the Interior
USFWS	United States Fish and Wildlife Service
USFS	United States Forest Service
VCU	Value Comparison Unit
VQO	Visual Quality Objective
WAA	Wildlife Analysis Area

Acronyms

A-frame LTF

Log transfer facility system which consists of a stationary mast with a falling boom for lifting logs from trucks to water. This system is generally located on a shot rock embankment with a vertical bulkhead to access deep water, accommodating operations at all tidal periods.

Access

The opportunity to approach, enter, and make use of public lands.

Access management

The designation of roads for differing levels of use by the public.

Aerial harvest systems

See Logging Systems

Alaska National Interest Lands Conservation Act (ANILCA)

Passed by Congress in 1980, this legislation designated 14 National Forest wilderness areas in Southeast Alaska. Section 810 requires evaluations of subsistence impacts before changing the use of these lands.

Alaska Native Claims Settlement Act (ANCSA)

Approved December 18, 1971, ANCSA provides for the settlement of certain land claims of Alaska natives and for other purposes.

Alaska Pulp Corporation (APC)
Previously Alaska Lumber and Pulp Corporation.

Alevin
Young salmon that are still attached to the yolk sac, which provides nourishment.

All-terrain vehicle (ATV)
A wheeled vehicle less than 40 inches wide.

Allowable Sale Quantity (ASQ)
The maximum quantity of timber that may be sold each decade from suitable lands covered by the Forest Plan.

Alluvium
A deposit of sand or mud formed by moving water.

Alluvial fan
A fan-shaped deposit of sand, gravel, and fine material made by a stream where it runs out onto a level plain or meets a slower stream.

Alpine/subalpine habitat
The region found on a mountain peak above tree growth.

Alternative
One of several policies, plans, or projects proposed for decision-making.

Amenity
Resource use, object, feature, quality, or experience that gives pleasure or is pleasing to the mind or senses. Amenity values typically are those for which monetary values are not or cannot be established.

Anadromous
Fish that ascend from the sea to breed in freshwater streams.

Anadromous fish
Anadromous fish spend part of their lives in fresh water and part of their lives in salt water. Anadromous fish include pink, chum, coho, sockeye, and king salmon, and steel head trout. There are also anadromous Dolly Varden Char.

Anadromous Fisheries Habitat Assessment
An assessment conducted in 1994 within the Tongass National Forest (published in 1995) to study the effectiveness of current procedures for protecting anadromous fish habitat and determine the need for any additional protection.

Analysis area
An area of land which has the same timber management costs and responses to timber management activities.

Appraisal
See Timber Appraisal.

Aquatic Habitat Management Unit (AHMU)
A mapping unit that displays an identified value for aquatic resources. It is a mechanism for carrying out aquatic resource management policy.

For 1997 TLMP:
Class I: Streams and lakes with anadromous or adfluvial fish habitat; or high quality resident fish waters listed in Appendix 68.1, Region 10 Aquatic Habitat management Handbook (FSH 2609.24), June 1986; or habitat above fish migration barriers known to be reasonable enhancement opportunities for anadromous fish.

Class II: Streams and lakes with resident fish populations and generally steep (6-15 percent) gradient (can also include streams from 0-5 percent gradient) where no anadromous fish occur, and otherwise not meeting Class I criteria. These populations have limited fisheries values and generally occur upstream of migration barriers or have other habitat features that preclude anadromous fish use.

Class III: Perennial and intermittent streams with no fish populations but which have sufficient flow or transport sufficient sediment and debris to have an immediate influence on downstream water quality or fish habitat capability. These streams generally have bankfull widths greater than 5 feet and are highly incised into the surrounding hillslope.

Class IV: Intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capabilities to have an immediate influence on downstream water quality or fish habitat capability. These streams generally are shallowly incised into the surrounding hillslope.

Non-streams: Rills and other watercourses, generally intermittent and less than 1 foot in bankfull width, little or no incisement into the surrounding hillslope, and with little or no evidence of scour.

For TLMP 1979:
Class I AHMU: Streams with anadromous or high quality sport fish habitat. Also included is the habitat upstream from a migration barrier known to have reasonable enhancement opportunities for anadromous fish.

Class II AHMU: Streams with resident fish populations and generally steep (6 to 15 percent) gradient (can also include streams from 0 to 6 percent gradient where no anadromous fish occur). These populations have limited sport fisheries values and are separate from the high quality sport fishing systems included in Class I. They generally occur upstream of migration barriers or are steep gradient streams with other habitat features that preclude anadromous fish use.

Class III AHMU: Streams with no fish populations but have potential water quality influence on the downstream aquatic habitat.

Background
The distance part of a landscape. The seen or viewed area located from 3 to 5 miles to infinity from the viewer. See also Foreground and Middleground.

Beach fringe habitat
Habitat that occurs from the intertidal zone inland 1,000 feet, and islands of less than 50 acres.

Bedload
Sand, silt, and gravel, or soil and rock debris rolled along the bottom of a stream by the moving water.

Benthic
Refers to the substrate and organisms on the bottom of marine environments.

Best Management Practice (BMP)
Practices used for the protection of water quality. BMP's are designed to prevent or reduce the amount of pollution from nonpoint sources or other adverse water quality impacts while meeting other goals and objectives. BMP's are standards to be achieved, not detailed or site-specific prescriptions or solutions. BMP's as defined in the USDA Forest Service Soil and Water Conservation Handbook are mandated for use in Region 10 under the Tongass Timber Reform Act.

Biological diversity (Biodiversity)
The variety of life in all its forms and at all levels. This includes the various kinds and combinations of: genes; species of plants, animals, and microorganisms; populations; communities; and ecosystems. It also includes the physical and ecological processes that allow all levels to interact and survive. The most familiar level of biological diversity is the species level, which is the number and abundance of plants, animals, and microorganisms.

Boardfoot
A unit of wood 12" X 12" X 1". One acre of commercial timber in Southeast Alaska yields on the average 18,000 to 34,000 board feet per acre (ranging from 8,000 to 90,000 board feet per acre). One million board feet (MMBF) would be the volume of wood covering one acre two feet thick. One million board feet yields approximately enough timber to build 120 houses.

Bog
An undrained or imperfectly drained area with a vegetation complex composed of sedges, shrubs, and sphagnum mosses, typically with peat formation. See also Muskeg.

Bole
Trunk of the tree.

Broadcast burning
Burning or an area that has been clearcut to remove logging slash from the site. Broadcast burning is done to prepare sites for regeneration or improve wildlife habitat.

Brush disposal
Cleanup and disposal of slash and other hazardous fuels within the forest or project areas.

Buffer
The Tongass Timber Reform Act requires that timber harvest be prohibited in an area no less than 100 feet of uncut timber in width on each side of all Class I streams and Class H streams which flow directly into Class I streams. This 100-foot area is known as a buffer.

Candidate species
Those species of plant or animal which are under consideration (by US Fish and Wildlife Service and National Marine Fisheries Service) for listing as threatened or endangered but which are provided no statutory protection under the Endangered Species Act.

Canopy
See Overstory.

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Cant
A log partly or wholly cut and destined for further processing.

Capability
An evaluation of a resource's inherent potential for use.

Carrying capacity
The maximum number of species that can be supported indefinitely by available resources in a given area.

Cave
Any naturally occurring void, cavity, recess, or system of interconnected passages which occurs beneath the surface of the earth or within a cliff or ledge and which is large enough to permit an individual to enter.

Cave resources
Any material or substance occurring in caves on Federal lands, such as animal life, plant life, paleontological resources, cultural resources, sediments, minerals, speleogens and speleothems.

Channel types
The defining of stream sections based on watershed runoff, landform relief, and geology.

Class I, II, III, IV, and Non-streams
See Aquatic Habitat Management Units.

Clearcut
The harvesting in one cut of all trees on an area. The area harvested may be a patch, strip, or stand large enough to be mapped or recorded as a separate class in planning for sustained yield. Clearcut size on the Tongass National Forest is limited to 100 acres, except for specific conditions noted in the Alaska Regional Guide.

Climax
A community of plants and animals which is relatively stable over time and which represents the late stages of succession under the current climate and soil conditions.

Code of Federal Regulations
A codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government.

Commercial Forest Land (CFL)
Productive forest land that is producing or capable of producing continuous crops of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for management and generally capable of producing in excess of 20 cubic feet per acre of annual growth or in excess of 8,000 board feet net volume per acre. It includes accessible and inaccessible areas.

Commercial thinning
Thinning a stand where the trees to be removed are large enough to sell.

Commodity
Resources with monetary (market) or commercial value; all resource products which are articles of commerce, e.g., timber and minerals.

Corridor
Connective links of certain types of vegetation between patches of suitable habitat which are necessary for certain species to facilitate movement of individuals between patches of suitable habitat. Also refers to transportation or utility right-of-way.

Cover
Refers to trees, shrubs, or other landscape features that allow an animal to partly or fully conceal itself.

Critical habitat
Specific terrain within the geographical area occupied by threatened or endangered species. Physical and biological features that are essential to conservation of the species and which may require special management considerations or protection are found in these areas.

Cruise
Refers to the general activity of determining timber volume and quality, as opposed to a specific method.

Cultural resources
Historic or prehistoric objects, sites, buildings, structures, etc. that result from past human activities.

Cumulative effects
The impacts on the environment resulting from the addition of the incremental impacts of past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions occurring over time.

Cumulative visual disturbance
The percent of a viewshed's seen area in a disturbed condition at any point in time.

Current timber supply
Timber specified by the Forest Service that has not been rejected by the purchaser and that has undergone analysis under the National Environmental Policy Act.

Cutover
Areas harvested recently.

Diameter at breast height (dbh)
The diameter of a tree measured 4 feet 6 inches from the ground.

Debris avalanche
The sudden movement downslope of the soil mantle; it occurs on steep slopes and is caused by the complete saturation of the soil from prolonged heavy rains.

Debrisflow
A general term for all types of rapid movement of debris downslope.

Debris torrents
Landslides that occur as a result of debris; avalanche materials which either dam a channel temporarily or accumulate behind temporary obstructions such as logs and forest debris.

Deer winter range
Locations that provide food and shelter for Sitka black-tailed deer under moderately severe to severe winter conditions.

Degradation
The general lowering of the surface of the land by erosive processes, especially by the removal of material through erosion and transportation by flowing water.

Demographic
Pertaining to the study of the characteristics of human populations, such as size, growth, density, distribution, and vital statistics.

Developed recreation
Recreation that requires facilities that, in turn, result in concentrated use of an area, such as campgrounds and ski areas. Facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings. See also Dispersed recreation.

Direct employment
The jobs that are immediately associated with the long-term contract timber sale including for example logging sawmills and pulp mills.

Discounted benefits
The sum of all benefits derived from the forest over the life of a project.

Discounted costs
The sum of all costs incurred from the Project Area during the period of project implementation.

Discount rate
The rate used to adjust future benefits or costs to their present value.

Dispersed recreation
Recreational activities that are not confined to a specific place and are generally outside developed recreation sites. This includes activities such as scenic driving, hiking, backpacking, hunting, fishing, snowmobiling, horseback riding, cross-country skiing, and recreation in primitive environments. See also Developed recreation.

Doline
A relatively shallow bowl- or funnel-shaped depression ranging in diameter from a few to more than 3,000 feet. Also known as a sinkhole.

Down
A tree or portion of a tree that is dead and laying on the ground.

Draft Environmental Impact Statement
A statement of environmental effects for a major Federal action which is released to the public and other agencies for comment and review prior to a final management decision. Required by Section 102 of the National Environmental Policy Act (NEPA).

Duff
Vegetative material covering the mineral soils in forests, including the fresh litter and well decomposed organic material and humus.

Eagle nest tree buffer zone
A 330-foot radius around eagle nest trees established in a Memorandum of Understanding between the U.S. Fish and Wildlife Service and the Forest Service.

Effects
Effects, impacts, and consequences as used in this EIS are synonymous. Effects may be ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historical, cultural, economic, or social and may be direct, indirect, or cumulative.

Direct Effects-Results of an action occurring when and where the action takes place.

Indirect Effects-Results of an action occurring at a location other than where the action takes place and/or later is time, but in the reasonably foreseeable future.

Cumulative Effects-See Cumulative Effects

Encumbrance
A claim, lien, charge, or liability attached to and binding real property.

Endangered species
A species of plant or animal which is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the 1973 Endangered Species Act. See also Threatened Species, Sensitive Species.

Endemic
Peculiar to a particular locality; indigenous.

Environmental analysis
A comprehensive evaluation of alternative actions and their predictable short-term and long-term environmental effects, which include physical, biological, economic, social, and environmental design factors and their interactions. An EA is less comprehensive than an EIS, and may result in a Finding of No Significant Impact. Should the EA reveal significant impacts a full EIS must then be conducted.

Erosion
The wearing away of the land surface by running water, wind, ice, gravity, or other geological activities.

Escapement
Adult anadromous fish that escape from all causes of mortality (human-caused or natural) to return to streams to spawn.

Estuarine fringe habitat
A 1,000-foot zone around an estuary.

Estuary
For the purpose of this EIS process, estuary refers to the relatively flat intertidal and upland areas generally found at the heads of bays and mouths of streams. They are predominantly mud and grass flats and are unforested except for scattered spruce or cottonwood.

Even-aged management
Management that results in the creation of stands in which trees of essentially the same age grow together. Clearcut, shelterwood, and other tree-cutting methods produce even-aged stands. See also Uneven-aged Management.

Executive order
An order issued by the President of the United States that has the force of law.

Existing visual condition (EVC)
The level of visual quality or condition presently occurring on the ground. The six existing visual condition categories are:
Type I: These areas appear to be untouched by human activities.

Type II: Areas in which changes in the landscape are not noticed by the average person unless pointed out.

Type III: Areas in which changes in the landscape are noticed by the average person but they do not attract attention. The natural appearance of the landscape still remains dominant. *Type IV* Areas in which changes in the landscape are easily noticed by the average person and may attract some attention. Although the change in landscape is noticeable it may resemble a natural disturbance.

Type V: Areas in which changes in the landscape are obvious to the average person. These changes appear to be major disturbances.

Type VI: Areas in which changes in the landscape are in glaring contrast to the natural landscape. The changes appear to be drastic disturbances.

Falldown
The difference between planned or scheduled harvest and that which is attained after implementation.

Fen
A tract of low, marshy ground consisting of organic terrain, relatively rich in mineral salts. See also Muskeg.

Final Environmental Impact Statement (FEIS or Final EIS)
The final version of the statement of environmental effects required for major federal actions under Section 102 of the National Environmental Policy Act. It is a revision of the Draft EIS to include public and agency responses to the draft. The decisionmaker chooses which alternative to select from the Final EIS, and subsequently issues a Record of Decision (ROD).

Fine
Minute particles of soil.

Fiscal year
The Federal Government's accounting period. October 1 through September 30; e.g., October 1, 1991 to September 30, 1992 = Fiscal Year 1992.

Fish habitat
The aquatic environment and the immediately surrounding terrestrial environment that combined afford the necessary physical and biological support systems required by fish species during various life stages.

Fish timing
A mitigation measure that restricts construction activities within an anadromous fish stream to minimize impacts on fish eggs, fry, and migrating salmonids. The normal period during which construction is permitted in fish streams is May 15 to August 20.

Floodplain
The lowland and relatively flat areas joining inland and coastal waters including debris cones and flood-prone areas of offshore islands; including at a minimum that area subject to a 1 percent (100-year recurrence) or greater chance of flooding in any given year.

Fluvial
Of or pertaining to streams and rivers.

Forage
To wander or go in search of food.

Forb
Any herbaceous plant that is not a grass or grass-like. Includes plants that are commonly called weeds or wildflowers.

Foreground
The stand of trees immediately adjacent to a scenic area, recreation facility, or forest highway; the area located less than 1/4 mile from the viewer. See also Background and Middleground.

Forest or forest system land
National Forest lands currently supporting or capable of supporting forests at a density of 10 percent crown closure or better. Includes all areas with forest cover, including old growth and second growth, and both commercial and noncommercial forest land.

Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA)
Amended in 1976 by the National Forest Management Act.

Forested habitat
All areas with forest cover. Used in this EIS to represent a general habitat zone.

Forested wetland
A wetland whose vegetation is characterized by an overstory of trees that are 20 feet or taller.

Forest Supervisor
The Forest Service officer responsible for administering a single national forest. The office of the Forest Supervisor for the Ketchikan Area of the Tongass National Forest is located in Ketchikan, Alaska.

Geographic Information System (GIS)
An information processing technology to input, store, manipulate, analyze, and display spatial and attribute data to support the decision-making process. It is a system of computer maps with corresponding site-specific information that can be electronically combined to provide reports and maps.

Glide channel
Channel types that occur on lowlands and landforms and are mostly associated with bogs, marshes, or lakes.

Grabinski
A modified highlead cable logging system.

Groundwater
Water within the earth that supplies wells and springs.

Guidelines
A preferred or advisable course of action or level of attainment designed to promote achievement of goals and objectives.

Habitat
The sum total of environmental conditions of a specific place that is occupied by an organism, population, or community of plants or animals.

Habitat capability
An estimate of the number of healthy individuals of a species that a habitat can sustain.

Haulout
An area of large, smooth rocks used by seals and sea lions for resting and pupping.

Humus
Substance of organic origin that is fairly but not entirely resistant to further bacterial decay.

IMPLAN
A computer-based system used by the Forest Service for constructing nonsurvey models to measure economic input. The system includes a database for all counties in the United States and a set of computer program to retrieve data and perform the computational tasks for input output analysis.

Inclusions
Soil types that are not delineated on soil resource inventory maps because they are too small (in area) to be mapped at the scale used in the inventory at any locale.

Indicator species
See Management Indicator Species

Indirect employment
The jobs in service industries that are associated with the Long-Term Contract timber sale including for example suppliers of logging and milling equipment. See also Direct Employment.

Interdisciplinary Team (IDT)
A group of people with different backgrounds assembled to research, analyze, and write a project EIS. The team is assembled out of recognition that no one scientific discipline is sufficiently broad enough to adequately analyze a proposed action and its alternatives.

Irretrievable commitments
Loss of production or use of renewable natural resources for a period of time. For example, timber production from an area is irretrievably lost during the time an area is allocated to a no-harvest prescription; if the allocation is changed to allow timber harvest, timber production can be resumed. The production lost is irretrievable, but not irreversible.

Irreversible commitments
Decisions causing changes that cannot be reversed. For example, if a roadless area is allocated to allow timber harvest, and timber is actually harvested, that area cannot at a later time be allocated to wilderness. Once harvested, the ability of the area to meet wilderness criteria has been irreversibly lost. Often applies to nonrenewable resources such as minerals and cultural resources.

Issue
A point, matter, or section of public discussion of interest to be addressed or decided.

Karst
A type of typography that develops in areas underlain by soluble rocks, primarily limestones. Sinkholes, collapsed channels, vertical shafts, and caves are formed when the subsurface layer dissolves. Areas on which karst has developed are said to display "karst topography."

Knutsen- Vandenberg Act (KV)
An Act was passed by Congress in 1930 and amended in 1976 to provide for reforestation, resource protection, and improvement projects in timber sale areas from funds collected as a portion of the stumpage fee paid by the purchaser. Examples of such projects are stream bank stabilization, fish passage structures, and wildlife habitat improvement.

Landscape-level diversity
A function of the spatial distribution of habitat types across a large area (Sidle 1985) such as a Project Area or ecological province.

Land Use Designation (LUD)
A defined area of land specific to which management direction is applied.

Large woody debris (LWD)
Any large piece of relatively stable woody material having a least diameter of greater than 10 centimeters and a length greater than one meter that intrudes into the stream channel.

Layout
Planning and mapping (using aerial photos) of harvest and road systems needed for total harvest of a given area.

Logging Systems
Highlead: A cable yarding system, using a two-drum yarder, in which lead blocks are hung on a spar or tower to provide lift to the front end of the logs.

Aerial Logging Systems: Systems where the cut logs are moved from the stump to the loading area or log deck without touching the ground.

Live Skyline/Gravity Carriage Return: A two-drum, live skyline yarding system in which the carriage moves down the skyline by gravity; thus, it is restricted tophill yarding. The skyline is lowered to attach logs then raised and pulled to the landing by the mainline.

Live Skyline/Haulback Required: A live skyline yarding system composed of skyline, mainline, and haulback; the carriage is pulled to the woods by the haulback; the skyline is lowered to permit the chokers to be attached to the carriage, and the turn is brought to the landing by the mainline.

Running Skyline: A yarding system with three suspended moving lines, generally referred to as the main, haulback, and slack-pulling, that when properly tensioned will provide lift, travel, and control to the carriage; normally indicates a gantry-type tower and a three-drum yarder. *Standing Skyline:* Used wherever yarding distances or span distances exceed the capability of live skyline equipment.

Tractor: Used to describe the full range of surface-skidding equipment, designed to operate on level to downhill settings.

Shovel A system of short-distance logging in which logs are moved from the stump to the landing by repeated swinging with a swing-boom log loader; the loader is walked off the haul road and out into the harvest unit; logs are moved and decked progressively closer to the haul road with each pass of the loader; when logs are finally decked at roadside, the same loader, or a different loader, loads out trucks. On gentle ground, logs are either heeled and swung or dragged by the boom as it rotates; larger log length and tree length logs are usually dragged to maintain machine stability. Soils should be moderate to well-drained and side slopes must be less than 20 percent; passes or stripes should be kept to a maximum of four.

Helicopter: Flight path cannot exceed 40 percent downhill or 30 percent uphill; landings must be selected so there is adequate room for the operation and so that the helicopter can make an upwind approach to the drop zone.

A-Frame: Beach fringe timber which is logged with a float-mounted yarder typically rigged in a highlead configuration for direct A-frame yarding.

Cold-deck and Swing: Planned to access areas not suitable for skyline operations.

Log Transfer Facility (LTF)
A facility that is used for transferring commercially harvested logs to and from a vessel or log raft or the formation of a log raft. It is wholly or partially constructed in waters of the United States and siting and construction are regulated by the 1987 Amendments to the Clean Water Act. Formerly termed "terminal transfer facility."

Management Indicator Species (MIS)
Species of vertebrates and invertebrates whose population changes are believed to best indicate the effects of land management. The following categories were used where appropriate: endangered and threatened plant and animal species identified on State and Federal lists; species with special habitat needs that may be influenced significantly by planned management programs; species commonly hunted, fished, or trapped; nongame species of special interest; additional plant or animal selected because their population changes are believed to indicate effects of management activities on other species of a major biological community or on water quality.

Management prescriptions
Management practices and intensity selected and scheduled for application on a specific area (e.g., a land use designation) to attain multiple-use and other goals and objectives.

Marginal
Commercial forest land (CFL) areas that do not qualify as standard or special CFL since they are not operable under short-term (ten years or less) projections of accessibility and economic conditions.

Mass failure
The downslope movement of a block or mass of soil. This usually occurs under conditions of high-soil moisture and does not include individual soil particles displaced as surface erosion.

Mass movement
General term for a variety of processes by which large masses of earth material are moved downslope by gravity either slowly or quickly.

Mass Movement Index (MMI)
Rating used to group soil map units that have similar properties with respect to the stability of natural slopes.

Mass wasting
A general term for a variety of processes by which large masses of earth material are moved by gravity either slowly or quickly from one place to another. Also known as mass movement.

McGilvery soil
Soil type which represents the only well-drained organic soil found in the Ketchikan Area. It is composed of a thin layer (less than 8 inches deep) of organic duff overlying bedrock or boulders, generally occupying the upper backslopes of hills and mountains. These soils are associated with cliffs and rock outcrops, and are sensitive to disturbance.

Mid-market analysis
The value and produce mix represented at the quarter in which the pond log value (end-product selling price less manufacturing cost) for the species and product mix most closely matches the point between the ranked quarters of the Alaska Index Operation pond log value, adjusted to Common Year Dollars, where one half of the harvest of timber from the Tongass National Forest has been removed at higher values and one half of the timber has been removed at lower values during the period from 1979 to the current quarter (FSH 2409.22 R10 Chapter 531.1-2).

Mineral soils
Soils consisting predominantly of, and having is properties determined by, mineral matter.

Mitigation
Measures designed to counteract environmental impacts or to make impacts less severe. These measures may include avoiding an impact by not taking a certain action or part of an action, minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during he life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

Model
A representation of reality used to describe, analyze, or understand a particular concept. A model may be a relatively simple qualitative description of a system or organization, or a highly abstract set of mathematical equations. A model has limits to its effectiveness and is used as one of several tools to analyze a problem.

Monitoring
A process of collecting information to evaluate whether or not objectives of a project and its mitigation plan are being realized. Monitoring can occur at different levels: to confirm whether mitigation measures were carried out in the matter called for (Implementation Monitoring); to confirm whether mitigation measures were effective (Effectiveness Monitoring); or, to validate

whether overall goals and objectives were appropriate (Validation Monitoring). Different levels call for different methods of monitoring.

Multi-Entry Layout Plan (MELP)
Interdisciplinary design and mapping of all potential timber harvest units, including associated logging and transportation systems, within a project area.

Muskeg
In Southeast Alaska, a type of bog or fen that has developed over thousands of years in depressions or flat areas on gentle to steep slopes. Also called peatlands.

Natal streams
Home stream where an anadromous fish is hatched.

National Environmental Policy Act (NEPA)
An act, passed by Congress in 1969, that declared a national policy to encourage productive harmony between humans and their environment to promote efforts that will prevent or eliminate damage to the environment and the biosphere and stimulate the health and welfare of humans to enrich the understanding of the ecological systems and natural resources important to the nation and to establish a Council on Environmental Quality. This act requires the preparation of environmental impact statements for federal actions that are determined to be of major significance.

National Forest Management Act (NFMA)
A law passed in 1976 that amends the Forest and Rangeland Renewable Resources Planning Act that requires the preparation of Forest plans, Regional guides, and regulations to guide that development.

Native allotment
At tract of non-mineral land, not to exceed 160 acres, on which an Alaska Native (who was 21 years of age or head of a household) established continuous use and occupancy prior to the creation of the National Forests (authorized under the Native Allotment Act of May 17, 1906).

Native Selection
Application by Native corporations and individuals to a portion of the Bureau of Land Management for conveyance of lands withdrawn in fulfillment of Native entitlements established under ANCSA.

Net sawlog volume
Trees suitable in size and quality for producing logs that can be processed into lumber. In Southeast Alaska, depending on the market, the volume may be processed as pulp or lumber.

No-action alternative
The most likely condition expected to exist in the future if current management direction were to continue unchanged.

Noncommercial forest land
Land with more than 10 percent cover of commercial forest tree species but not qualifying as commercial forest land (CFL).

Non-interchangeable components

Non-interchangeble components (NIC's) are defined as increments of the suitable land base and their contribution to the allowable sale quantity (ASQ) that are established to meet Forest Plan objectives. NIC's are identified as parcels of land and the type of timber thereon which are differentiated for the purpose of Forest Plan implementation. The total ASQ is derived from the sum of the timber volumes from all NIC's. The NIC's cannot be substituted for each other in the timber sale program.

NIC I Normal Operability: This is volume scheduled form suitable lands using existing logging systems. Most of these lands are expected to be economic under projected market conditions. On average, sales from these lands have the highest probability of offering a reasonable opportunity for a purchaser to gain a profit from his/her investment and labor. This is the best operable ground.

Normal operability includes those systems most frequently used on the Tongass. These systems are tractor, shovel, standard cable and some helicopter.

Tractor: Tractor logging includes all ground wheel or track system used for skidding logs to a landing. Shovel yarding is included; however, tractor or rubber-tire skidding used in conjunction with swing operations are not included.

Standard Cable: The most typical logging systems used on the Tongass. Included in the standard cable system component are highlead uphill, highlead downhill, slackline, running skyline, and flyer.

Standard Helicopter: Helicopter yarding with yarding distances up to three quarters of a mile.

NIC II: Difficult and Isolated Operability. This is volume scheduled from suitable lands that are available for harvest using logging systems not in common use in Southeast Alaska. Most of these lands are presently considered economically and technologically marginal.

Difficult operability includes those systems used on the Tongass which have significantly higher cost. These may include balloon, long-span skyline, multi-span, or helicopter with yarding distances greater than three-quarters of a mile. This category also includes lands which have limited access as a result of being isolated by prior harvest activities or other management activities.

Long Span Cable: Cable systems which require longer than average yarding distances. Typical long span cable systems considered are standing skylines and multispans.

Access Limitation: Logging systems required for areas with access limitation concerns. The logging system could be highlead cable when access to timber and roading is difficult. Typical harvest systems are helicopter and swing operations.

Isolated Operability: This class is comprised entirely of isolated stands. These are small stands of isolated timber which are extremely difficult to harvest. The harvest system could vary, but would be more costly due to the location of the stand. Typical harvest systems are helicopter with average yarding distances greater than one mile.

Notice of Intent (NOI)
A notice printed in the Federal Register announcing that an EIS will be prepared. The NOI must describe the proposed action and possible alternatives, describe the agency's proposed scoping process, and provide a contact person for further information. The NOI for this project was

submitted on March 1, 1990.

Offering
A Forest Service specification of timber harvest units, subdivisions, roads, and other facilities and operations to meet the requirements of a timber sale contract.

Off-highway vehicle (OHV)
Any vehicle that is restricted by law from operating on public roads for general motor vehicle traffic. Includes motorbikes, minibikes, trailbikes, snowmobiles, dunebuggies, all-terrain vehicles, and four-wheel drive, high clearance vehicles (FSM 2355.01). Sometimes referred to as Off-road vehicle or ORV.

Old-growth forest
Ecosystems distinguished by the later stages of forest stand development that differs significantly from younger forests in structure, ecological function, and species composition. Old-growth forest is characterized by a patchy, multi-layered canopy; trees that represent many age classes; large trees that dominate the overstory, large standing dead (snags) or decadent trees; and higher accumulations of large down woody material. The structure and function of an old-growth ecosystem will be influenced by its stand size and landscape position and context.

Overmature
The stage at which a tree declines in vigor and soundness, for example, past the period of rapid height growth.

Overstory
The portion of trees in a forest that forms the uppermost layer of foliage, usually formed by the tallest trees. Also called the canopy.

Partial cutting
Method of harvesting trees (not clearcutting) where any number of live stems are left standing in any of various spatial patterns. Can include seed tree, shelterwood, or other methods.

Peak Flow
The highest discharge of water recorded over a specified period of time at a given stream location.

pH
The degree of acidity or alkalinity.

Planning area
For the purpose of analyzing viable populations, the planning area is the ecological province, i.e., North Central Prince of Wales province and South Prince of Wales province.

Planning record
A detailed, formal account of the planning process for an EIS. The record contains data, maps, reports, planning process information, and results of public participation in the planning process. The Planning Record documents the decisions and activities that resulted in the Final EIS. Planning records are available for public review upon request under the Freedom of Information Act.

Pleistocene
The epoch forming the first half of the Quatemary period, originating about one million years ago.

Pond value
The delivered price of logs at the mill minus the cost to manufacture them into usable products.

Precommercial thinning
The practice of removing some of the trees of less than marketable size from a stand in order to achieve various management objectives.

Present net value
The difference between benefits and costs associated with the alternatives.

Record of Decision (ROD)
A document separate from but associated with an EIS that states the decision, identifies all alternatives, specifying which were environmentally preferable, and states whether all practicable means to avoid environmental harm from the alternatives have been adopted, and if not, why not.

Recreation Opportunity Spectrum (ROS)
The system for planning and managing recreation resources that categorizes recreation opportunities into six classes. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skill needed to enjoy the area, and the relative density of recreation use. The classes are:
Primitive: An essentially unmodified natural environment of fairly large size. Interaction between users is very low, and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use is generally not permitted.
Semi-Primitive Nonmotorized: A natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed to minimize onsite controls and restrictions. Use of local roads for recreational purposes is not allowed.
Semi-Primitive Motorized: A natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed to minimize onsite controls and restrictions. Local roads used for other resource management activities may be present.
Roaded Natural: A natural-appearing environment with moderate evidence of the sights and sounds of humans. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high with evidence of other users prevalent. Motorized use is allowed.
Roaded Modified: A natural environment that has been substantially modified particularly by vegetation manipulation. There is strong evidence of roads and/or highways. Frequency of contact is low to moderate.
Rural: A natural environment that has been substantially modified by development of structures and vegetative manipulation. Structures are readily apparent and may range from scattered to small dominant clusters. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high.

Reforestation
The natural or artificial restocking of an area with trees.

Regeneration
The process of establishing a new crop of trees on previously harvested land.

Region

An area covered by a Forest Service regional guide. A region is generally composed of one or more national forests. Forest Service Region 10 includes the Tongass National Forest and the Chugach National Forest.

Regional Forester
The Forest Service official responsible for administering a single region.

Regional Guide
The guide developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended. It guides all natural resource management activities and establishes management standards and guidelines for the National Forest System lands within a given report.

Research Natural Area (RNA)
An area set aside by a public or private agency specifically to preserve a representative sample of an ecological community primarily for scientific and educational purposes. In Forest Service usage, RNA's are areas designated to ensure representative samples of as many major naturally occurring plant communities as possible.

Reserved
Lands that have been withdrawn from the timber base by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service.

Reserve trees
Merchantable or submerchantable trees and snags that are left within the harvest unit to provide biological habitat components over the next management cycle.

Resident fish
Fish that are not anadromous and that reside in fresh water on a permanent basis. Resident fish include non-anadromous Dolly Varden char and cutthroat trout.

Retention
A visual quality objective which provides for management activities that are not visually evident to the casual observer.

Riparian Area
Transition zone between a stream or lake system and the adjacent land. Identified in part by soil characteristics or distinctive plant communities that require free or unbound water.

Riparian ecosystems
A transition between the aquatic ecosystem and the adjacent terrestrial ecosystem; identified by soil characteristics or distinctive vegetation communities that require free or unbound water.

Riparian management area
Land areas delineated in the Forest Plan to provide for the management of riparian resources. Specific standards and guidelines, by stream process group, are associated with riparian management areas. Riparian management areas may be modified by watershed analysis.

Road maintenance level
The level of service provided by, and maintenance required for, a specific road consistent with road management objectives and maintenance criteria (FSH 7709.58, Section 12.3).

Maintenance Level 1: Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period is one year or longer. Basic custodial maintenance is performed.
Maintenance Level 2: Assigned to roads open for use by high-clearance vehicles. Passenger car traffic is not a consideration.
Maintenance Level 3: Assigned to roads open and maintained for travel by the prudent driver in a standard passenger car. User comfort and convenience are not considered priorities.
Maintenance Level 4.. Assigned to roads that provide a moderate degree to user comfort and convenience at moderate travel speeds.
Maintenance Level 5: Assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-laned and paved, or aggregate surfaced with dust abatement.

Road Management Objective (RMO)
Defines the intended purpose of an individual road based on Management Area direction and access management objectives. Road management objectives contain design criteria, operation criteria and maintenance criteria. Long-term and short-term roads have RMO's.

Roads
Arterial: Developed an operated for long-term land and resource management purposes to constant service.
Collector: Collects traffic from Forest local roads; usually connects to a Forest arterial or public highway.
Local: Provides access for a specific resource use activity such as a timber sale or recreational site, although other minor uses may be served.
Preplanned: Roads planned in a prior EIS.
Temporary: For National Forest timber sales temporary roads are constructed to harvest timber on a one-time basis. These logging roads are not considered part of the permanent forest transportation network and have stream crossing structures removed erosion measures put into place, and the road closed to vehicular traffic after harvest is completed.

Roadless Area
An area of undeveloped public land identified in the roadless area inventory of the TLMP Revision within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use.

Rotation
The planned number of years (approximately 100 years in Alaska) between the time that a Forest stand is regenerated and its next cutting at a specified stage of maturity.

Salvage sale
A timber sale to use dead and downed timber and scattered poor-risk trees that would not be marketable if left in the stand until the next scheduled harvest.

Sawlog
That portion of a tree that is suitable in size and quality for the production of dimension lumber, collectively known as sawtimber.

Scheduled timber harvests
Timber harvests done as part of meeting the allowable sale quantity.

Scoping process
Early and open activities used to determine the scope and significance of a proposed action, what level of analysis is required, what data is needed, and what level of public participation is appropriate. Scoping focuses on the issues surrounding the proposed action and the range of actions, alternatives, and impacts to be considered in an EA or an EIS.

Second-growth forest
Forest growth that has become established following some disturbance such as cutting serious fire, or insect attack; even-aged stands that will grow back on a site after removal of the previous timber stand.

Seedling/sapling stage
The stage following timber harvest when most of the colonizing tree and shrub seedlings become established. Usually I to *25* years.

Selection cutting
The annual or periodic removal or trees (particularly mature trees), individually or in small groups from an uneven-aged forest to realize the yield and establish a new crop of irregular constitution.

Sensitive species
Plant and animal species which are susceptible or vulnerable to activity impacts or habitat alterations. Those species that have appeared in the Federal Register as proposed for classification or are under consideration for official listing as endangered or threatened species, that are on a nonofficial State list, or that are recognized by the regional forester as needing special management on national forest lands to prevent placement on Federal or state lists.

Sensitivity level
The measure of people's concern for the scenic quality of the National Forests. In 1980 the Tongass National Forest assigned sensitivity levels to land areas viewed from boat routes and anchorages, plane routes, roads trails, public use areas, and recreation cabins.
Level I: Includes all seen areas from primary travel routes use areas and water bodies where at least three-fourths of the forest visitors have a major concern for scenic quality
Level II: Includes all seen areas from primary travel routes, use areas, and water bodies where at least one-fourth of the forest visitors have a major concern for scenic quality.
Level III: Includes all seen areas from secondary travel routes, use areas, and water bodies where less than one-fourth of the forest visitors have a major concern for scenic quality.

Shade tolerance
Tree species that have physiological growth processes adapted to shaded environments Western hemlock is a shade tolerant species. Other tree species tolerance to shade may range from tolerant to intolerant.

Shelterwood cutting
A harvest method in which most of the trees are removed in an initial entry and some trees are left to naturally reseed the area and provide protection to new seedlings that establish on a site. A second entry may be conducted later to remove the remaining trees.

Significant
Specific legal term under the National Environmental Policy Act that requires considerations of both context and intensity in evaluating impacts.

Silvical characteristics
Physiological and genetic characteristics of individual tree species and the ecological characteristics (biological and environmental factors) of the site which enable a specific species to be adapted to a particular and unique site.

Silviculture
The art, science and practice of controlling the establishment, composition, structure and growth of trees and other vegetation in forest stands.

Silviculture practices
Management techniques used to modify, manage and replace a forest over time. Silvicultural practices are classified according to the method of carrying out the process (shelterwood, seed tree, clearcut, commercial thinning, etc.).

Sinkhole
Relatively shallow, bowl- or funnel-shaped depressions ranging in diameter from a few to more than 3,000 feet.

Site index
A measure of a forest area's relative productive capacity for tree growth. Measurement of site index is based on height of dominant trees in a stand at a given age.

Slash
Debris left over after a logging operation i.e., limbs, bark, broken pieces of logs.

Smolt
A juvenile salmon, trout, or Dolly Varden migrating to the ocean and undergoing physiological changes to adapt its body from a freshwater to a saltwater environment.

Snag
A standing dead tree, usually greater than 5 feet tall and 6 inches in diameter at breast height.

Soil productivity
Capacity of soil to produce plant growth due to the soil's chemical, physical, and biological properties.

Soil texture
Relative amounts of sand, silt, and clay in a soil. Coarse-textured soils are generally considered sandy and often contain gravel of various sizes. Fine-textured soils are considered very fine, sandy, silty, or clay.

Special use permit
Permits and granting of easements (excluding road permits and highway easements) authorizing the occupancy and use of land.

Stand (tree stand)
A group of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition as to be distinguishable from the forest in adjoining areas.

Standard
A course of action or level of attainment required by the Forest Plan to promote achievement of goals and objectives.

Stand-level diversity
The diversity within specific habitats or limited land areas as measured by number of species present (species richness) or structural complexity of a given habitat type (Sidle 1985).

State Historic Preservation Officer (SHPO)
State appointed official who administers Federal and State programs for cultural resources.

State selection
Application by Alaska Department of Natural Resources to the Bureau of Land Management for conveyance of a portion of the 400,000-acre State entitlement from vacant and unappropriated National Forest System lands in Alaska under the Alaska Statehood Act.

Stream classes
See Aquatic Habitat Management Unit

Structural diversity
The diversity of forest structure, both vertically and horizontally, which provides for variety of forest habitats such as logs and multi-layered forest canopy for plants and animals.

Stumpage
The value of timber as it stands uncut in terms of dollar value per thousand board feet.

Subsistence use
The customary and traditional uses by rural Alaskan residents of wild renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter or sharing, for personal or family consumption; and for customary trade.

Subsistence use area
Important Subsistence use areas include the “most reliable” and “most often hunted” categories from the Tongass Resource Use Cooperative Survey (TRUCS) and from subsistence survey data from ADF&G, the University of Alaska, and the Forest Service-Region 10. Important use areas include both intensive and extensive use areas for subsistence harvest of deer, furbearers, and salmon.

Substantive comment
A public comment that provides factual information, professional opinion, or informed judgment germane to the action being proposed.

Succession
The ecological progression of community change over time, characterized by displacements of species leading to a relatively stable climax community.

Suitable forestland
Commercial forestland identified as having both the biological capability and availability to produce industrial wood products.

Sustained yield
The amount of renewable resources that can be produced continuously at a given intensity of management.

Temporary roads
See Roads

Tentatively suitable forestland
Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary of Agriculture or the Chief of the Forest Service; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that it is possible to restock adequately within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

Third order watershed
A watershed that contains a third order stream segment.

Thousand board foot measure (MBF)
A method of timber measurement equivalent to 1000 square feet of lumber one inch thick.

Threatened species
A species of plant or animal likely to become endangered within the foreseeable future throughout all or a significant portion of its range, as defined in the Endangered Species Act of 1973, and which has been designated in the Federal Register by the Secretary of the Interior as a threatened species. (See also Endangered Species and Sensitive Species.)

Tiering
Eliminating repetitive discussion of the same issue by incorporating by reference. The general discussion in an EIS of broader scope; e.g., this document is tiered to TLMP, as amended.

Timber appraisal
Establishing the fair market value of timber by taking the selling value minus manufacturing costs, the cost of getting logs from the stump to the manufacturer, and an allowance for profit and risk.

Timber entry
A term used to refer to how far into the timber rotation an area is on the basis of acreage harvested. For example, if an area is being managed for 3 entries over a 100-year rotation, the first entry would be completed when one-third (approximately 33 percent) of the available acreage is harvested (usually in 30-40 years); the second entry would be completed when two-thirds (approximately 66 percent) of the available acreage is harvested (usually 60-70 years); the third entry would be completed when all of the available acreage is harvested (at the end of the rotation).

Timber production
The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use.

Tongass Land Management Plan (TLMP)
The 10-year land allocation plan for the Tongass National Forest that directs and coordinates planning and the daily uses and activities carried out within the forest.

Tongass Resource Use Cooperative Survey (TRUCS)
A compilation of data on subsistence uses for evaluating the effects of the proposed action in this EIS.

Traffic service levels
Traffic characteristics and operating conditions that are used in setting road maintenance levels.

Turbidity
An indicator of the amount of suspended sediments in water.

Understory
The trees and shrubs in a forest growing under the main crown canopy or overstory.

Uneven-aged management
The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular size to retain within each area, thereby maintaining a planned distribution of size classes.

Unsuitable
Forest land withdrawn from timber utilization by statute or administrative regulation (e.g., wilderness), or identified as not appropriate for timber production in the forest planning process.

Utility logs
Those logs that do not meet sawlog grade but are suitable for production of firm usable pulp chips.

Value Comparison Unit (VCU)
Areas which generally encompass a drainage basin containing one or more large stream systems; boundaries usually follow easily recognizable watershed divides. Established to provide a common set of areas where resource inventories could be conducted and resource interpretations made.

Viable population
The number of individuals in a species required to ensure the continued long-term existence of the population in natural, self-sustaining populations and adequately distributed throughout the region.

Viewshed
An expansive landscape or panoramic vista seen from a road, marine waterway, or specific viewpoint.

Visual Absorption Capacity (VA C)
An estimate of the relative ability of a landscape to absorb alteration yet retain its visual integrity.

Visual Quality Objective (VQO)
Measurable standards reflecting five different degrees of landscape alteration based upon a landscape's diversity of natural features and the public's concern for high scenic quality. The five categories of VQO's are:
Preservation: Permits ecological changes only. Applies to wilderness areas and other special classified areas.
Retention: Provides for management activities that are not visually evident; requires reduction

of contrast through mitigation measures either during or immediately after operation. *Partial Retention:* Management activities remain visually subordinate to the natural landscape. Mitigation measures should be accomplished within one year of project completion.
Modification: Management activities may visually dominate the characteristics landscape. However activities must borrow from naturally established form line color and texture so that its visual characteristics resemble natural occurrences within the surrounding area when viewed in the middleground distance.
Maximum Modification: Management activities may dominate the landscape. Mitigation measures should be accomplished within five years of project completion.

Volume
Stand volume based on standing net board feet per acre by Scribner Rule.

Volume class
Used to describe the average volume of timber per acre in thousands of board feet (MBF). The seven volume classes include:
Classes 1 to 3: Less than 8 MBF/acre (cleared land seedlings or pole timber stands).
Class 4: 8 to 20 MBF/acre.
Class 5: 20 to 30 MBF/acre.
Class 6: 30 to 50 MBF/acre.
Class 7: 50+ MBF/acre.

V-notch
A deeply cut valley along some waterways, generally in steep, mountainous terrain, that would look like a "V" from a frontal view.

Volume Strata
Divisions of old-growth timber volume derived from the interpreted timber type data layer (TIMTYP) and the common land unit data layer (CLU). Three volume strata (low, medium, and high) are recognized in the Forest Plan for each Administrative Area.

Watershed
That area that contributes water to a drainage or stream; portion of a forest in which all surface water drains to a common point. Can range from a few tens of acres that drain a single small intermittent stream to many thousands of acres for a stream that drains hundreds of connected intermittent and perennial streams.

Wetland
Areas that are inundated by surface or groundwater frequently enough to support vegetation that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mudflats, and natural ponds.

Wild and Scenic Rivers
Rivers or sections of rivers designated by congressional actions under the 1968 Wild and Scenic Rivers Act. Wild and scenic rivers may be classified and administered under one or more of the following categories:
Wild river areas: Rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.
Scenic river areas: Rivers or sections of rivers that are free of impoundments, with watersheds

still largely primitive and shorelines largely undeveloped, but accessible in places by roads. *Recreational river areas:* Rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Wilderness
Areas designated under the 1964 Wilderness Act. Wilderness is defined as undeveloped federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions. In Alaska, wilderness also has been designated by TTRA and ANILCA.

Wildlife Analysis Area (WAA)
Alaska Department of Fish and Game administrative designation of an area that includes one or several Value Comparison Units (VCU's) for wildlife analysis and regulating wildlife populations.

Wildlife habitat
The locality where a species may be found and where the essentials for its development and sustained existence are obtained.

Wildlife Habitat Management Unit (WHMU)
An area of wildlife habitat identified during the IDT process as having values important to wildlife.

Windfirm
Configuration of harvest units so as not to create an opening which exposes the adjacent stand of timber to the direction of the major prevailing storm wind (southeast).

Windthrow
The act of trees being uprooted, blown down, or broken off by storm winds. Three types of windthrow include: endemic where individual trees are blown over, catastrophic where a major windstorm can destroy hundreds of acres, and management related where the clearing of trees in an area makes the adjacent standing trees vulnerable to windthrow.

Winter range
An area, usually at lower elevation, used by big game during the winter months.

Withdrawal
The withholding of an area of Federal land from settlement, sale, location, or entry under some or all of the general land laws of the purposes of limiting activities under those laws to maintain other public values in the area.

Yarding
Hauling timber from the stump to a collection point.

Yield tables
Tables that estimate the level of outputs that would result from implementing a particular activity. Usually referred to in conjunction with FORPLAN input or output. Yield tables can be developed for timber volumes, range production, soil and water outputs, and other resources.

Chapter 7

Distribution List

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Agencies

Advisory Council on Historic Preservation, Office of Program Review and Education
Alaska Board of Fisheries
Alaska Department of Commerce and Economic Development
Alaska Department of Environmental Conservation
Alaska Department of Environmental Conservation, Commissioner
Alaska Department of Environmental Conservation, Director, Environmental Quality Division
Alaska Department of Environmental Conservation, SE Region Manager
Alaska Department of Fish and Game
Alaska Department of Fish and Game, Area Habitat Biologist
Alaska Department of Fish and Game, Forestry-Consistency Team
Alaska Department of Fish and Game, FRED Division
Alaska Department of Fish and Game, Division of Boards/SERC
Alaska Department of Fish and Game, Division of Habitat
Alaska Department of Fish and Game, Division of Sport Fishing
Alaska Department of Fish and Game, Division of Subsistence
Alaska Department of Fish and Game, Division of Wildlife Conservation
Alaska Department of Fish and Game, FRED Division
Alaska Department of Fish and Game, FRED Klawock Hatchery
Alaska Department of Fish and Game, Office of Commissioner
Alaska Department of Natural Resources, Division of Forestry
Alaska Department of Natural Resources, Division of Parks and Outdoor Recreation
Alaska Department of Natural Resources, Office of Commissioner
Alaska Department of Natural Resources, State Historic Preservation Office
Alaska Department of Natural Resources, Regional Office
Alaska Department of Transportation
Alaska Division of Government Coordination
Alaska Legislative Information Office
Federal Aviation Administration, Office of the Regional Director
Federal Energy Regulatory Commission, Advisor on Environmental Quality
Federal Highway Administration, Regional Administrator, Region 10
National Marine Fisheries Service, Division Chief
National Marine Fisheries Service, Protected Resources Management Division
Naval Oceanography Division
NOAA Ecology and Conservation Office
Office of Chief of Navy Operations, U.S. Navy Environmental Protection Division
Southeast Alaska Federal Subsistence Regional Advisory Council
U.S. Army Corps of Engineers
U.S. Army Engineering Division, North Pacific, CENPD
U.S. Bureau of Indian Affairs
U.S. Bureau of Mines
U.S. Bureau of Mines, Juneau Branch
U.S. Department of Agriculture, Forest Service
U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station

7 Distribution List

U.S. Department of Agriculture, National Agricultural Library
U.S. Department of Agriculture, National Agricultural Library, Head, Acquisitions and Services Branch
U.S. Department of Agriculture, Office of Equal Opportunity
U.S. Department of Agriculture, Soil Conservation Service
U.S. Department of the Army, U.S. Army Engineer District, Alaska, Chief, Regulatory Branch
U.S. Department of Energy, Director, Office of Environmental Compliance
U.S. Department of Housing and Urban Development, Environmental Officer
U.S. Department of the Interior, Bureau of Land Management
U.S. Department of the Interior, Office of Environmental Affairs
U.S. Department of Transportation, Assistant Secretary for Policy
U.S. Environmental Protection Agency
U.S. Environmental Protection Agency, EIS Review Coordinator
U.S. Environmental Protection Agency, Office of Environmental Review
U.S. Environmental Protection Agency, Office of Federal Activities, NEPA Compliance Division
U.S. Fish and Wildlife Service
U.S. Fish and Wildlife Service, Ketchikan
U.S. Fish and Wildlife Service, Regional Director
U.S. Forest Service, Chugach National Forest
U.S. Forest Service, Mt. Baker-Snoqualmie National Forest
U.S. Forest Service, Regional Office, Regional Forester
U.S. Forest Service, Ketchikan Area
U.S. Forest Service, Stikine Area
U.S. Forest Service, Tongass National Forest, Chatham Area
U.S. Forest Service, Tongass National Forest, Thorne Bay Ranger District
U.S. Forest Service, Tongass National Forest, Craig Ranger District
U.S. Forest Service, Tongass National Forest, Ketchikan Ranger District
U.S. Forest Service, Tongass National Forest, Thorne Bay Ranger District
U.S. Forest Service, Tongass National Forest, Wrangell Ranger District

Libraries

Craig Public Library
Hyder Public Library
Ketchikan Public Library
Klawock Public Library
Metlakatla Community School Library
Petersburg Public Library
Thorne Bay Community Library
University of Alaska Southeast, Librarian
Wrangell Public Library

Media

Daily Sitka Sentinel
Island News, Editor
Juneau Empire
Ketchikan Daily News
KGTW FM/KTKN AM Radio
KINY/KSUM Radio
KRBD FM Radio
Wrangell Sentinel

Organizations and Businesses

Alaska Forest Association
Alaska Lumberman's Association
Alaska Native Sisterhood
Alaska Society of Forest Dwellers

Alaska Women in Timber
Alaskans for Responsible Resource Management
Byron Bros. Cutting
Clover Bay Lodge
Control Lake Citizen's Group
Craig Advisory Committee
Craig Community Association
Earth Justice Legal Defense Fund
Edna Bay Advisory Committee
Forest Guardians and Forest Conservation Council
Forest Service Employees for Environmental Ethics
Foster Wheeler Environmental Corporation
Greater POW Chamber of Commerce
Harza Engineering Company
Harza Northwest, Inc.
Historical Research Associates
Hydaburg Advisory Committee, Chairperson
Impact Assessment, Inc.
Interstate Commerce Commission, Chief, Energy and Environment
Ketchikan Advisory Committee
Ketchikan Air Service, Inc.
Ketchikan Chamber of Commerce, Executive Director
Ketchikan Indian Corporation, Executive Director
Ketchikan Pulp Company
Klawock Advisory Committee
Klawock Cooperative Association
Klawock Heenya Corporation, President
Klawock Tribal Government
Koncor Forest Products Company
Lynn Canal Corporation
Naukati School
Petersburg Chamber of Commerce
Point Baker Community Council
POW Conservation League, Chairperson
Prince of Wales Chamber of Commerce
Robertson, Monagle, and Eastaugh
SE Alaska Conservation Council
Sealaska Corporation
Sealaska Timber
Shaan-Seet, Inc.
Silver Bay Logging
Society of American Foresters
Southeast Alaska Conservation Company
Stuntzner Engineering and Forestry (203)
Sumner Strait Advisory Committee
Thorne Bay School
Timber Consultants, Inc.
Tongass Cave Project
Tongass Conservation Society
Tongass Tribe
Whale Pass School
Wrangell Advisory Committee
Wrangell Resource Council
Ziegler, Cloudy, King and Peterson

7 Distribution List

Public Officials and Offices

Alaska Office of the Governor, Alaska Land Use Council
Alaska Office of the Governor, Division of Government Coordination
Alaska State Senator Robin Taylor
City of Coffman Cove, Mayor
City of Craig, City Administrator
City of Hydaburg, Administrator
City of Kasaan, Mayor
City of Ketchikan, Mayor
City of Klawok
City of Klawok, Mayor
City of Kupreanof
City of Port Alexander, Mayor
City of Thorne Bay, Administrator
City of Thorne Bay, Mayor
Ketchikan Gateway Borough, Borough Manager
Ketchikan Gateway Borough, Mayor
Legislative Information Office
U.S. House of Representatives, Donald Young
U.S. Senator Frank Murkowski
U.S. Senator Ted Stevens

Individuals

Richard and Kay Andrew
Glen Arnold
Fred and Cheryl Athorp
Judy Brakel
Jackie Canterbury
Jacob Cebula
Jo Chatham
John M. Clifton
Steve Connelly
Susan Domenowski
Ernie Eads
Bruce N. Eagle
Frank C. Ellis
Ben Fairbanks
Cheryl Fecko
Marvin George
Julie Hammond-Penn
William Hollywood IV
William J. Holman
Jerry Jones
Ward Lamb
Jack Leighty
Steve Lewis
Heidi Lindgren
David Love
James Mackovjak
Mike McKimens
Mark Minillo
Ben Mirchell
Dick Myren
Ronald Paden
David K. Person
Jack Piccolo
Jim Rehfeldt
Bill Rotecki
Dan Santner
Walter Shuham
Pete Smith
Cathy Starkweather
C. Streuli
John R. Swanson
Patrick and Ginny Tierney
Kenneth D. Vaughan, P.E.
Ed Zastrow

Chapter 8

Preparers

Chapter 8

Preparers

***Randal L. Fairbanks**, Project Manager

M.S., Forest Resources Wildlife Science and Biostatistics, University of Washington, 1979 B.S., Forest Resources Wildlife Science, 1972

Foster Wheeler Environmental: 18 years Other: 3 years

Twenty-one years experience in the design, coordination, and management of comprehensive environmental monitoring programs, ecological research and inventories, impact assessments, and mitigation plans. Key contributor or project manager for more than 10 major EIS/EA efforts, half for the Forest Service. Managed wildlife studies for several Alaska-based environmental projects in southeast and south-central Alaska. Also participated in studies on the North Slope, in the Chukchi Sea, Bering Sea, and Aleutian Islands.

***Tom Stewart**, IDT Leader, Soils and Watershed, Water Resources

Ph.D., Physical Geography, University of Alberta, 1988
M.S., Physical Geography, University of Alberta, 1981
B.A., Physical Geography, University of California, 1974

Foster Wheeler Environmental: 5 Other: 11

Sixteen years experience in geomorphology, hydrology, soil-vegetation-landform relations, and wetlands delineation. Experienced in field and analytical studies of sediment transport; assessing impacts of forestry operations, roads, and structures on stream, slope, and soil stability; and in mitigating these impacts through implementation of BMP's and compliance with State and Federal regulations. Worked for four seasons with the Forest Service on the Tongass and Chugach National Forests conducting soil surveys; mapping soils, vegetation, and stream channels; locating roads; and conducting soil and erosion control.

Larry Lunde, Forest Service Team Leader (Contracting Officer's Representative [CORI])
B.S., Forest Management, Washington State University, 1973

USDA Forest Service: 20

Tongass National Forest, Ketchikan Area Planning Staff. Previous experience in forest and multiple-use management positions as District Resource Staff and District Ranger on: Nez Perce National Forest in Idaho, El Dorado National Forest in California, Gifford Pinchot National Forest in Washington, Mount Hood and Fremont National Forests in Oregon.

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* ID Team Member

8 Preparers

***Al Wolfson**, Silviculture, Economics

Graduate Study in Forest Economics, University of Washington, 1987-91
M.F., Forest Management, Oregon State University, 1971
B.S. Forest Management, Utah State University, 1970

Foster Wheeler Environmental: 3 Other: 21

Twenty-one years experience in natural resource management. Sixteen years with the USDA Forest Service as a District Ranger, certified silviculturist, and resource planner. Since 1986 as a consulting forester and economist Mr. Wolfson has performed over 40 feasibility studies and environmental assessments for natural resource clients.

***Jeff Boyce**, Vegetation and Timber

Silviculture Institute (currently enrolled)
M.S., Forest Resource Management, University of Washington, 1990
B.S., Forest Management, Washington State University, 1985

Harza Northwest: 4 Other: 7

Expertise in various areas of forest resource management, contract administration, and microcomputer systems. Project experience on EIS's, surveys, timber sales, and mapping projects including aerial photo interpretation and mapping as used for forest stand inventory, wildlife habitat management, and forested wetland delineation; forest inventory sampling; Northern Spotted Owl habitat surveying and mapping; timber sale layout planning for clearcut and partial cut logging systems; and identification of cutting unit boundaries for the protection of riparian corridors and wildlife retention areas.

***Elizabeth Ablow**, Fisheries

B.A., Environmental Studies, Yale University, 1987
B.A., Anthropology, Yale University, 1987

Foster Wheeler Environmental: 5 Other: 2

Seven years of experience in conducting stream habitat studies that have included collecting hydraulic, water quality, and stream habitat field data; identifying riparian vegetation; mapping riparian and stream habitats; conducting stream reach stability surveys; and conducting IHM studies. Conducts extensive fish population surveys on both game and nongame fish species.

***Cindi Confer**, Wildlife

B.S., Wildlife Science, Oregon State University, 1988

Harza Northwest: S Other: 3

Extensive experience with USDA Forest Service projects in wildlife habitat assessment and management. Expertise in Northern Spotted Owl and big game surveys, data analysis and interpretation, and mitigation and enhancement planning from project work at Harza Northwest and previously as a wildlife biologist with the USDA Forest Service.

Garrett Jackson, Soils

M.S., Geosciences, University of Arizona, 1990
B.S., Geosciences, University of Arizona, 1986

Foster Wheeler Environmental: 3 Other: 3

Six years of theoretical and applied geomorphology, including field and analysis work for various EIS's and EA's. Expertise in hillslope studies; mapping of stream channels, fluvial deposits, and landforms; soil-vegetation associations; and geologic hazard evaluation.

Amichay Greenstein, Economist/Planner

M.A., Development Economics, The American University, Washington D.C., 1991
B.S., Business Administration/Accounting, The American University, 1989

Foster Wheeler Environmental: 4 Other: 2

Six years of experience in socioeconomic impact and economic feasibility analysis of environmental, construction, and maintenance projects. Directly responsible for the methodological analysis of local and regional economic and social impacts on population, employment, housing, and communal services as well as assessment of project economic and financial viability.

Geoffrey M. McNaughton, Silv. Prescriptions, Field Manager

Ph.D., Forest Resources, University of Washington, 1991
M.S., Botany, University of Wyoming, 1984
B.S., Forest Science/Botany, University of Montana, 1981

Foster Wheeler Environmental: 3 Other: 15

Eighteen years of experience in forest ecology, tree physiology, and forest management, including extensive experience on the Polk Inlet Timber Sale project on Prince of Wales Island. Served as field manager and primary author of silvicultural prescriptions on the Control Lake Project.

Robert Rogers, Watershed

M.S., Geology/Geomorphology, Colorado State University, 1989
B.S., Geology, Appalachian State University, 1986

Foster Wheeler Environmental: 2 Other: 5

Over seven years experience in designing, collecting, analyzing, and preparing reports in geologic, hydrologic, and geomorphic studies for research and environmental assessment in the United States and Central America.

8 Preparers

***Richard Bielefeld**, Geology, Karst

Postgraduate Studies, Civil Engineering, Long Beach State University, 196
B.S., Geology, Long Beach State University, 1961

Harza Engineering Company: 3 Other: 26

Almost 30 years of experience in field investigation, design, project management, and preparation of geological and geophysical reports for feasibility, reinvestigation, SEED studies, and site seismic analyses.

Craig Cooper, Geology, Karst

M.S., Geological Sciences, Western Washington University, 1994
B .A., Business Administration, University of Washington, 1986

Harza Northwest: 2

Project experience in environmental impact assessment and geology with expertise in practical karst hydrology and emphasis on groundwater monitoring. Comprehensive experience in karst vulnerability assessment.

***Mark Greenig**, Landscape Resource Planner, Recreation Resources Team Leader M.U.P., Urban Planning, Texas A&M University, 1985

B.S., Landscape Architecture, California Polytechnic State University, 1978

Foster Wheeler Environmental: 4 Other: 11

Fifteen years of experience in planning, evaluating, designing, and managing projects in the built and natural environment. Work includes environmental impact assessment, recreation planning, recreation facility design, visual resource analysis, site planning, landscape design, real estate development, and tourism planning.

Kathy Smayda, Harza Northwest Project Manager

M.S., Botany, University of Washington, 1982
B.S., Biology/Ecology, Marlboro College, Vermont, 1978

Harza Northwest: 10 Other: 1

Extensive experience as a wetlands specialist, botanist, and ecologist in wetland delineation, wildlife habitat assessment, wildlife mitigation planning, and biological interpretation for projects including various plant and wildlife surveys, EIS's, EA's, and monitoring studies.

Steve Bedross, Visual Resources

M.L.A., Landscape Architecture, University of Michigan, 1990
B.S., Natural Resources, University of Michigan, 1987

Harza Northwest: 5 Other: 4

Experienced in environmental impact assessment, wetland mitigation, and landscape planning/design, including USDA Forest Service projects. Has conducted wetland assessments; planned and implemented visual impact studies; participated in recreation master planning and detailed design; and conducted environmental studies for hydropower licenses.

***Rick Suttle**, Visual Resources

M.L.A., Landscape Architecture, University of Michigan, 1978 B.S., Natural Resources, University of Michigan, 1975

Harza Northwest: 17 years Other: 3 years

Extensive project experience with environmental impact assessments, site selection studies, recreation and land management, reclamation/landscape restoration projects, and wetland inventories and mitigation. Mr. Suttle also managed Harza's computer-generated simulation system used for assessing visual impacts and presenting proposed design solutions, frequently gives agency and public presentations, and has served as an expert witness on recreation and visual resources at FERC hearings in Washington, D.C.

***Keith Jehnke**, Transportation Engineer

B.S., Forest Engineering, Oregon State University, 1986
B.S., Civil Engineering, Oregon State University, 1986

Stuntzner Engineering and Forestry: 7 Other: 2

Project engineer on numerous design/construction management projects with extensive experience working with local, state, and national permitting/planning requirements. Has also worked on various surveys, water rights, timber inventory projects, and timber sales, including the Lab Bay EIS in Southeast Alaska. Licensed professional engineer.

Cliff Barnhart, Logging Engineer

B.S., Forest Engineering, Oregon State University, 1987

Stuntzner Engineering and Forestry: 3 Other: 3

Logging engineer with extensive experience in road and timber harvest unit design, including network and economic analysis. Experience with timber management, reforestation, appraisals, and analysis of logging systems.

Judith Schneider, NEPA/Public Involvement Coordinator B .A., English/History, University of Wisconsin-Oshkosh, 1966

Foster Wheeler Environmental: 6 Other: 20

Twenty-four years of experience in public, political, and community relations and in the development and production of public information materials. Public involvement task manager for numerous EIS's and hazardous waste Superfund projects.

8 Preparers

Kristin Avery, NEPA/Public Involvement Coordinator

B.A., English-Writing Arts/Philosophy (pending), State University of New York at Oswego

Foster Wheeler Environmental: 3 Other: 3

Six years of experience in public education and community involvement, including the development and production of public information materials. Experience working with tribes; communicating sensitive or controversial issues; and coordinating large, complex events and meetings. Public involvement coordinator for other Alaska EIS's.

***T. Weber Greiser**, Cultural Resources Specialist

Graduate work, University of Colorado, completed 1977
M.S., Anthropology, University of New Mexico, 1972
B.A., Anthropology, University of New Mexico, 1969

Historical Research Associates, Inc.: 15

Thirteen years experience as project manager and/or principal investigator and eighteen years field experience on cultural resource projects in eight states. Expertise in archeological surveys, excavation, predictive modeling, laboratory analysis, historical archeology, and anthropological-legal studies.

Mike Galginaitis, Subsistence

Ph.D., Candidate, State University of New York, Binghamton
B.A., Social and Behavioral Sciences, Johns Hopkins University, 1973

Impact Assessment, Inc.: 8 Other: 5

Project coordinator, field researcher, analyst, and writer in the areas of subsistence and social impacts, primarily in Alaska. For the Lab Bay Project, responsibilities included subsistence and socioeconomic analyses of proposed timber sale options with primary responsibility for subsistence field work, Subsistence Resource Inventory and Environmental Consequences Reports, and sections of the EIS dealing with subsistence. Also participated in ANILCA hearings and DEIS scoping meeting. Extensive research experience on subsistence and socioeconomics.

Other Key Contributors

Ron Stuntzner, Lead Engineer
B.S., Forest Engineering, Oregon State University, 1964

Stuntzner Engineering and Forestry: 27 (owner/partner) Other: 6

Over 30 years experience in all aspects of forest engineering and consulting on various projects for timber companies, governmental agencies, and appraisers/financial institutions. Recently served as lead logging engineer on Lab Bay EIS in Southeast Alaska for the USDA Forest Service.

Eric Urstadt, Logging Engineer

B.S., Forest Engineering, Oregon State University, 1985

Stuntzner Engineering and Forestry: 3 Other: 6

Logging engineer with extensive experience in road design and timber sale layout. Survey crew chief on cadastral construction and property surveys. State-certified timber cruiser.

Jim Thrall, Harza Project Coordinator

Ph.D., Biological Science, Illinois State University, 1972
M.A., Biological Science, St. Mary's College, 1967
B.A., Biology, St. Mary's College, 1964

Harza Engineering Company: 20 Other: S

Served as lead environmental scientist and/or project manager for both environmental and resource planning projects, supervising the preparation of monitoring programs, EIS's, and EA's. Recently served as Project Manager for the USDA Forest Service Lab Bay EIS in Southeast Alaska.

Greg Green, Wildlife Biologist

M.S., Wildlife Ecology, Oregon State University, 1983
B.S., Biology, Eastern Oregon State College, 1978

Foster Wheeler Environmental: 8 Other: 7

Fifteen years experience in conducting wildlife population and habitat studies and producing related reports. Extensive experience throughout coastal and marine Alaska with both terrestrial and marine wildlife. Expertise with raptors, big game, and small mammals.

Mary Jo Russell, GIS Analyst

B.S., Business Administration, Menlo College, 1988

Foster Wheeler Environmental: 4 Other: 3

Seven years extensive experience includes GIS support for several USDA Forest Service EIS's. Expertise in digitizing; extensive analyses including suitable timber analysis, unharvested timber analysis, and total area analysis; surface modeling for perspective visual analysis; scanned ortho-photo image manipulation; extensive map production; and database manipulation and management.

8 Preparers

Jim Glassley, Senior GIS Analyst

B.S., Physical Geography, Western Washington University, 1990

Foster Wheeler Environmental: 3.5 Other: 1.5

Five years experience in applying computer cartography and GIS to wildlife management, natural resource management, and hazardous waste materials mitigation. Operates several GIS and computer cartography software programs to use in remote sensing, aerial photodigitizing, data input, spatial analyses, and map production.

Craig Lukin, GIS Manager

M.S. Marine Geology, Virginia Institute of Marine Science at the College of William and Mary, 1983
B.A., Geology, Queens College, City University of New York, 1977

Foster Wheeler Environmental: 2 Other: 14

Fourteen years experience in environmental-geological mapping; GIS analysis; applications development; and related technology. For the past 4 years, Mr. Lukin has applied GIS technology to hazardous waste RI's and FS's and NEPA EA's and EIS's.

Other Contributors

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